COLUMBIA BASIN FISH AND WILDLIFE AUTHORITY

1997 REVIEW OF PROJECTS

ABSTRACTS

Co-Sponsored by

Bonneville Power Administration

Northwest Power Planning Council

Public Power Council

and

Trout Unlimited

COLUMBIA BASIN FISH & WILDLIFE AUTHORITY

UMATILLA INDIAN RESERVATION · NEZ PERCE TRIBE · KALISPEL INDIANS · WASHINGTON WILDLIFE · SALISH KOOTENAI TRIBES · NATIONAL MARINE FISHERIES · YAKIMA NATION · WARM SPRINGS RESERVATION · IDAHO FISH & GAME · SHOSHONE PAIUTE TRIBES · BURNS PAIUTE INDIANS · WASHINGTON FISHERIES · KOOTENAI TRIBE · SPOKANE TRIBE · MONTANA FISH WILDLIFE & PARKS · COLVILLE RESERVATION · OREGON FISH & WILDLIFE · SHOSHONE BANNOCK TRIBES · U.S. FISH & WILDLIFE · COEUR D ALENE TRIBE

June 26,1997

T O : Interested Parties

FROM: Brian J. Allee, Ph.D.

SUBJECT: 1997 Review of Projects Abstracts

The Columbia Basin Fish and Wildlife Authority recently held a 1997 Columbia Basin Fish and Wildlife Program Review of Projects March 25 - 27,1997, in Portland, Oregon.

The event was co-sponsored by the Bonneville Power Administration, the Northwest Power Planning Council, the Public Power Council, and Trout Unlimited. The purpose was to provide the public with information and education on the approximate $127 million in Northwest electric ratepayer fish and wildlife mitigation projects funded annually through the guidance of the NPPC's Fish and Wildlife Program.

Project presenters participated in three concurrent sessions for three days, using audio-visual equipment to display their projects, and were available to answer questions from both peers and the public. Presenters also displayed an outstanding poster session.

Attendees were provided with a compilation of abstracts on all ongoing projects in the basin, however, due to limited time in arranging for the Review of Projects, not all of the abstracts were available, nor were any of the project funding levels.

Attached is the complete listing of abstracts and funding levels, for all fish and wildlife mitigation projects in the Columbia Basin. The following table of contents will guide you to several different tables outlining where to find a particular project or group of projects you may be interested in reviewing.

By providing this Abstract Summary, the co-sponsors and the CBFWA hope this information will improve the understanding of the fish and wildlife mitigation projects and how the Program has thus far been managed. There were over 300 attendees of the Review of Projects this year and we received many positive suggestions for improving the Review. Our goal is to sponsor this event again next year and to organize the 1998 Review of Projects to be held sometime in February.

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1997 Fish and Wildlife Program Review of Projects
AGENDA

PLENARY SESSION

Introduction - Brian Allee
Invocation
Plenary Speakers
Tom Dwyer, USFWS
Don Sampson, CTUIR

Time	Project #	Title	Presenter(s)
		MARCH 25, 1997 - 9 AM TO NOON	
SESSION 1		**Modeling** Session Chair: Tom Cooney, WDFW	
9:00		Introduction - Tom Cooney	
9:15	9601700	TECHNICAL SUPPORT FOR PATH	Dave Marmorek
9:15	9303701	TECHNICAL ASSISTANCE WITH THE LIFE CYCLE MODEL	Charlie Paulsen
9:15	9203200	LIFE-CYCLE MODEL DEVELOPMENT AND APPLICATION TO SYSTEM AND SUBBASIN PLANNING IN SNAKE RIVER	Danny Lee
9:15	9666666	PATH - FACILITATION,, TECH ASSISTANCE & PEER REVIEW	Dave Marmorek
9:15	9660800	PATH - PARTICIPATION BY STATE AND TRIBAL AGENCIES	Howard Schaller
10:45		BREAK	
1l:OO	8910866	MONITORING AND EVALUATION MODELING SUPPORT	James Anderson
11:30	9207102	TECHNICAL ASSISTANCE FOR JUVENILE AND ADULT MIGRANT MONITORING FACILITIES	Thomas J. Carlson
SESSION 2		**Snake and Lower Columbia Projects** Session Chair: Ray Beamesderfer, ODFW	
9:00	9405400	BULL TROUT STUDIES IN CENTRAL AND NE OREGON	Dave Buchanan
9:30	5505600	HABITAT ENHANCEMENT & PROTECTION - SHOSHONE-PAIUTE RESERVATION	Edith Manning
9:30	8815666	DUCK VALLEY FISH STOCKING PROGRAM	Edith Manning
9:30	9501560	BILLY SHAW RES DEVELOPMENT	Edith Manning
9:50		BREAK	
10:00	8605000	WHITE STURGEON PRODUCTIVITY STATUS AND HABITAT REQUIREMENTS	Tom Riin. George McCabe, John DeVore, Blaine Parker
10:30	9201066	HABITAT RESTORATION/ENHANCEMENT FORT HALL BOTTOMS	David Arthaud
11:00	9501666	GENETIC INVENTORY WESTSLOPE CUTTHROAT TROUT	Dana Weigel
11:30	9700900	SNAKE RIVER WHITE STURGEON PROJECT	Nancy Hoeffs
SESSION 3		**Watershed Projects - Upper Mid Columbia Subregion** Session Chair: John Easterbrooks, WDFW	
9:00	9107500	YAKIMA PHASE II SCREENS - CONSTRUCTION	Dennis Hudson
9:20	9105700	YAKIMA PHASE 2 SCREEN FABRICATION	John Easterbrooks
9:40	9503300	O&M OF YAKIMA FISH PROTECTION. MITIGATION & ENHANCEMENT FACILITIES	John Dyson
9:40	9200900	YAKIMA SCREENS - PHASE II - 0 8 M	John Easterbrooks
10:00		BREAK	
10:10	8506200	PASSAGE IMPROVEMENT EVALUATION	Duane A. Neitzel
10:40	9405900	YAKIMA BASIN ENVIRONMENTAL EDUCATION	Julie Bradley,.
II:oo	9502100	OKANOGAN WATERSHED PLANNING	Gerald Marco
11:20	9603401	METHOW VALLEY IRRIGATION DISTRICT CONVERSION	Mike Harris
11:40	9603501	SATUS WATERSHED RESTORATION	Dave Lind

Time	Project #	Title	Presenter(s)

MARCH 25,1997 - 1 PM TO 5 PM

SESSION 1 — Wildlife

Session Chair: Chris Merker, STI

1:00		Introduction - Chris Merker	
1:15		PROGRAM OVERVIEW	Chris Merker, Peter Paquet
1:45		Washinaton Panel Discussion	
	9206200	LOWER YAKAMA VALLEY WETLAND AND RIPARIAN COORIDOR RESTORATION PROJECT	Bill Bradley
	9204800	HELLSGATE WILDLIFE MITIGATION PROJECT	Steve Judd
	9506700	COLVILLE CONFEDERATED TRIBES PERFORMANCE CONTRACT	Steve Judd
	9305800	WDFW - WASHINGTON WILDLIFE MITIGATION AGREEMENT	JeneneRatassepp
	9106066	KALISPEL - PEND OREILLE WETLANDS	Ray Enk
2:45		Oregon Panel Discussion	
	9608000	NORTHEAST OREGON WILDLIFE MITIGATION PROJECT	Keith Lawrence
	9009200	CONFORTH RANCH - O&M AND ENHANCEMENTS	Cad Scheeler
	9506001	UMATILLA RIVER RIPARIAN COORIDORS: SQUAW CREEK	Carl Scheeler
	5519400	SECURING MITIGATION SITES FOR WILDLIFE IN THE COLUMBIA BASIN OF OREGON	Greg Siilii
	5519500	WILLAMETTE RIVER CONFLUENCE MITIGATION SITE	Greg Sieglitz ,
	9107800	BURLINGTON BOTTOMS WILDLIFE MITIGATION PROJECT	Greg Sieglitz
3:30		BREAK	
3:45		Idaho Panel Discussion	
	9266100	ALBENI FALLS WILDLIFE MITIGATION IMPLEMENTATION	Jerome Hansen
	9505700	SOUTHERN IDAHO MITIGATION	Jerome Hansen, Shaun Robertson
		DWORSHAK WILDLIFE MITIGATION	Loren Kronemann
4:30		Montana Panel Discussion	
		MONTANA TRUST FUND	Alan Wood, Dale Becker

SESSION 2 — Production - Lower Mid Columbia Subregion

Session Chair: Gary James, CTUIR

1:00	8805303	HOOD RIVER PRODUCTION PROGRAM - CTWS - M&E	Mii Jennings
I:oo	8865365	HOOD RIVER PRODUCTION (OAK SPRINGS MODIFICATION)	Mick Jennings
1:00	9301900	HOOD RIVER PRODUCTION PROGRAM (PARKDALE DESIGN & CONSTRUCTION)	Mick Jennings
1:00	9500700	HOOD RIVER PRODUCTION PROGRAM - PGE O&M	Mick Jennings
1:00	8862800	HOOD RIVER - PELTON LADDER - ODFW	Mii Jennings
1:35	8805364	HOOD RIVER PRODUCTION PROGRAM - ODFW - M&E	Rod French
1:50		BREAK	
2:w	8903500	UMATILLA HATCHERY OPERATIONS AND MAINTENANCE	Mike Hayes
2:w	9000500	UMATILLA HATCHERY - MONITORING/EVAL PROJECTS	Mike Hayes
2:30	8343500	UMATILLA HATCHERY SATELLITE FACILITIES OPERATION AND MAINTENANCE	Gary James
2:30	9101400	UMATILLA HATCHERY SATELLITE FACILITIES - PLANNING. SITING, DESIGN. AND CONSTRUCTION	Gary James
3:10	8816000	WILLAMETTE HATCHERY OXYGEN SUPP. PROJECT	Dick Ewing, Harry Lorz

SESSION 3 — Natural Production .

Session Chair: Fred Olney, USWFS

1:00		Introduction - Fred Olney	
1:05	8909600	GENETIC MONITORING AND EVALUATION OF SNAKE RIVER SALMON AND STEELHEAD	Robin Waples
. 1:30	9009300	LIFE HISTORY GENETIC ANALYSIS OF SNAKE RIVER SOCKEYE SALMON (ONCORHYNCHUS NERKA) (ESA)	Emest Brannon

Time	Project #	Title	Presenter(s)
1:55	9406900	DEVELOPMENT OF A SPAWNING HABITAT MODEL TO AID IN THE RECOVERY PLANS FOR SNAKE RIVER FALL CHINOOK: PRELIMINARY RESULTS FROM THE HANFORD REACH OF THE COLUMBIA RIVER	David R. Geist
2:20	9202604	INVESTIGATIONS INTO THE EARLY LIFE HISTORY OF SPRING CHINOOK . SALMON IN THE GRANDE RONDE RIVER BASIN	MaryLouise Keefe
2:45	9000501	UMATILLA BASIN NATURAL PRODUCTION MONITORING AND EVALUATION (UBNMPE)	Craig Contor
3:oo		BREAK	
3:10	9107300	IDAHO NATURAL PROD. MONITORING/EVAL	Russ Kiefer
3:30	9403400	ASSESSING SUMMER AND FALL CHINOOK RESTORATION IN THE SNAKE RIVER BASIN	Bill Amsberg
3:55	9102800	MONITORING THE SMOLT MIGRATIONS OF WILD SNAKE RIVER SPRING/SUMMER CHINOOK SALMON, 1989-1996	Stephen Achord
4:20	9402600	PACIFIC LAMPREY RESEARCH AND RESTORATION PROJECT	Gary James
4:40	5520800	LISTED STOCK ADULT ESCAPEMENT MONITORING	Paul A. Kucera
4:50	5506000	MONITORING FINE SEDIMENT LEVELS IN SUBSTRATE AND OVERWINTER SEDIMENTATION IN CLEANED GRAVELS IN PORTIONS OF THE GRANDE RONDE AND JOHN DAY RIVERS	Jonathan Rhodes

MARCH 25, 1997 - 7 PM TO 9 PM

SESSION 1 — Marking

Session Chair: Lee Blankenship, WDFW

7:oo	8201300	CODED-WIRE TAG RECOVERY	Ken Johnson, Wolf Dammers, Pat Frazier, Rod Kaiser
7:25	8331900	NEW FISH TAG SYSTEM	Earl Prentice
	8331901	PIT TAG MONITOR PROCUREMENT AND INSTALLATION (POSTER)	Sandy Downing
7:40	8816300	EFFECTS OF CODED WIRE TAGGING ON THE SURVIVAL OF SPRING CHINOOK	Lee Blankenship
8:00	8906500	ANNUAL FISH MARKING PROGRAM-MISSING HATCHERY PRODUCTION GROUPS OR/WA/ID (USFWS)	Steve Pastor, Howard Fuss, Bill Murray, Lee Blankenship
8:30		BREAK	
8:45	8906600	AN AUTOMATED FISH MARKING AND TAGGING SYSTEM	Lee Blankenship
	9207300	COL. BASIN PIT-TAG INFORMATION SYSTEM (POSTER)	Carter Stein

SESSION 2 — Basin-wide Coordination/Information -

Session Chair: Phil Roger, CRITFC

7:w		Introduction - Phil Roger	
7:05	9600500	OPERATION OF THE INDEPENDENT SCIENTIFIC ADVISORY BOARD	Chuck Coutant
7:30	8906200	PREPARE DRAFT ANNUAL IMPLEMENTATION WORK PLAN	Brian Allee
8:00		BREAK	
8:15	9204300	INTEGRATED HATCHERY OPERATIONS TEAM	Patty O'Toole
8:40	8810804	STREAMNET (FORMERLY CIS AND NED)	Drew Parkin

SESSION 3 — Predation/Enforcement/Harvest

Session Chairs: Tom DelaTorre, WDFW; Paul Hirose, ODFW; Frank Young, CBFWA

7:oo	9007700	NORTHERN SQUAWFISH MANAGEMENT PROGRAM	Dave Ward
7:30	9007800	SYSTEM-WIDE SIGNIFICANCE OF PREDATION ON JUVENILE SALMONIDS IN COLUMBIA AND SNAKE RIVER RESERVOIRS AND EVALUATION OF PREDATION CONTROL MEASURES	Dena Gadomskiiom Poe
7:30	8290300	SELECTIVE PREDATION/DEVELOPMENT OF PREY PROTECTION	Matthew Mesa/Tom Poe
6:00	9306000	COLUMBIA RIVER TERMINAL FISHERIES RESEARCH PROJECT	Paul Hirose, Marc Miller, Jim Hill
8:30	9202400	COLUMBIA BASIN LAW ENFORCEMENT PROGRAM	Pete Nylander

Time	Project #	Title	Presenter(s)
		MARCH 26,1997 - 8 AM TO NOON	
SESSION 1		**Production - Snake Basin** Session Chair: Sl Whitman, NPT	
8 : 0 0		Introduction - Si Whitman	
8:15	551400	SALMON RIVER PRODUCTION PROGRAM	Keith Kutchins
8:45	5521200	MONITORING AND EVALUATION OF LYONS FERRY HATCHERY FALL CHINOOK ABOVE LOWER GRANITE DAM	Billy D. Arnsberg
9:15	8335000	NEZ PERCE TRIBAL HATCHERY	Ed Larson
9:45	8805300	NORTHEAST ORE SPRING CHINOOK OUTPLANTING/FACILITY	Becky Ashe
lo:oo	8805300	NEZ PERCE NORTHEAST ORE HATCHERY	Becky Ashe
10:20		BREAK	
10:30	8805302	NE OREGON HATCHERY - GRAND RONDE SATELLITE FACILITIES	Gary James
11:00	8805305	NORTHEAST OREGON OUTPLANTING FACILITIES MASTER PLAN - NEZ PERCE TRIBE	Jim Phelps
11:20	9005500	STEELHEAD SUPPLEMENTATION STUDIES IN IDAHO RIVERS	Alan Byrne
11:40	9604300	JOHNSON CREEK ARTIFICIAL PROPAGATION ENHANCEMENT	Paul A. Kucera
SESSION 2		**Flathead and Kootenai Projects** Session Chairs: Ray Beamesderfer, ODFW; Brian Marotz, YDFWP	
8:00	9101964	HUNGRY HORSE MITIGATION - CRESTON FISH RECOVERY	Mark Maskell
8:30	9101903	HUNGRY HORSE MITIGATION/HABITAT IMPROVEMENTS	Ladd Knotek
9:oo	9101901	HUNGRY HORSE FISHERIES MITIGATION - CONFEDERATED SALISH AND KOOTENAI TRIBES	Barry Hansen
9:30	8806500	KOOTENAI RIVER FISHERIES INVESTIGATIONS	Vaughn Paragamian
9:30	9401200	KOOTENAI RIVER WHITE STURGEON - M&E	Vaughn Paragamian
10:20		BREAK	
10:30	8806400	KOOTENAI RIVER WHITE STURGEON STUDY AND EXPERIMENTAL AQUACULTURE	Sue Ireland
10:30	9404900	KOOTENAI RIVER ECOSYSTEM IMPROVEMENTS STUDY	Sue Ireland
11:00	8346700	LIBBY RESERVOIR LEVELS/KOOTENAI IFIM	Steve Dalby
11:30	8346500	LIBBY AND HUNGRY HORSE MODELING TECHNICAL ANALYSIS	Brian Marok
SESSION 3		**Captive Brood Stock** Session Chair: Conrad Mahnken, NMFS	
8:00		Introductton - Conrad Mahnken	
8:10	9204000	REDFISH LAKE SOCKEYE SALMON CAPTIVE BROODSTOCK REARING AND RESEARCH	Tom Flagg
8:30	9107200	REDFISH LAKE SOCKEYE SALMON CAPTIVE	Paul Kline / Doug Taki
8:50	9107100	SNAKE RIVER SOCKEYE SALMON HABITAT	Doug Taki
9:10	9604400	GRANDE RONDE BASIN SPRING CHINOOK CAPTIVE BROODSTOCK PROGRAM	Tim Whitesel
9:30	9700100	CAPTIVE REARING INITIATIVE FOR SALMON RIVER CHINOOK SALMON	Pete Hassener
9:50	5520600	LISTED STOCK GAMETE PRESERVATION	Paul A. Kucera
9:50	5520700	CAPTIVE BROODSTOCK ARTIFICIAL PROPAGATION	Paul A. Kucara
10:10		BREAK	
10:20	9305600	ASSESSMENT OF CAPTIVE BROODSTOCK TECH	Penny Swanson
10:20	9666700	MANCHESTER CAPTIVE BROODSTOCK 0 &M	Penny Swanson, et at.

Time	Project #	Title	Presenter(s)
		MARCH 26, 1997 - 1 PM TO 5 PM	
SESSION 1		**Watershed Projects - Lower Snake Subregion** Session Chair: Mary Lou Soscia, EPA	
1:00		Introduction - Mary Lou Soscia	
1:15	9202602	EASTERN WA MODEL WATERSHED COORDINATORS	Bob Bottman, Mark Shaw
1:30	9303800	HAYSFORK GLORY HOLE, NEWSOME CREEK PLACER MINE SILT TRAP - NEZ PERCE TRIBE	Ed Larson
1:30	9303501	LOWER RED RIVER MEADOW RESTORATION PROJECT	Steve Bauer
1:30	9607700	MEADOW CREEK RESTORATION	Wayne J. Paradis
2:15	9403900	WALLOWA BASIN PROJECT PLANNING - G. R. MODEL WATERSHED	Don Bryson
2:15	8402500	GRANDE RONDE HABITAT ENHANCEMENT	John (Andy) Andrews. Mary Lou Soscia
2:15	6402700	GRANDE RONDE MODEL WATERSHED HABITAT PROJECTS	Patty Perry
2:15	9202601	GRANDE RONDE MODEL WATERSHED - ADMIN/IMPL./RESEARCH	Patty Perry, Mark Shaw
3:20		BREAK	
3:30	9202603	IDAHO MODEL WATERSHEDS ADMIN/IMPL. SUPPORT	Biff Burleigh
3:30	9308200	SALMON RIVER ANADROMOUS FISH PASSAGE ENHANCEMENT, IDAHO	Chuck Keller
3:30	9401700	IDAHO MODEL WATERSHED HABITAT PROJECTS	Jude Trapani, Mark Shaw
3:30	9405000	SALMON RIVER HABITAT O&M/MONITORING & EVALUATION	Keith Kutchins
3:30	9600700	UPPER SALMON RIVER DIVERSION CONSOLIDATION PROGRAM	Keith Kutchins, Chuck Keller
3:30	9401500	IDAHO FISH SCREENING IMPROVEMENT	Patrick Marcuson
4:15	9401800	WASHINGTON MODEL WATERSHED HABITAT PROJECTS	Angela Fields , Art Sundertand, Duane Battles
SESSION 2		**Watershed Projects - Lower & Lower Mid Columbia** Session Chairsi Gary James, CTUIR	
1:00	9304000	FIFTEENMILE CREEK HABITAT IMPROVEMENT	Ray Hartlerode
1:00	9304500	BUCK HOLLOW WATERSHED ENHANCEMENT (ODFW)	Ray Hartlerode
1:00	9404200	TROUT CREEK OPERATION.& MAINTENANCE	Ray Hartlerode
1:20	9303000	BUCK HOLLOW WATERSHED ENHANCEMENT (SWCD)	Ron Graves
1:35	8402100	MAINSTEM, MIDDLE FORK, AND N. FORK JOHN DAY RIVER	Jeff Neal
1:55	8400800	NORTH FORK JOHN DAY HABITAT IMPROVEMENT	John Sanchez
2:00	9605300	NORTH FORK JOHN DAY RIVER DREDGE TAILINGS RESTORATION PROJECT	Ed Calama
2:20	8710001	UMATILLA RIVER BASIN ANADROMOUS FISH HABITAT ENHANCEMENT	Todd Shaw .
2:20	9506000	UMATILLA RIVER RIPARIAN CORRIDORS: SQUAW CREEK WATERSHED PROJECT (ANADROMOUS PORTION)	Todd Shaw
2:40	8710002	UMATILLA HABITAT IMPROVEMENT / ODFW	Troy Laws
2:55	9608500	COORDINATION OF WATERSHED PROJECTS IN UMATILLA RIVER BASIN	Luise Langhainricb
3:10		BREAK	
3:20	8802200	UMATILLA RIVER BASIN TRAP AND HAUL PROGRAM	Gary James
3:35	8902401	EVAL UMATILLA BASIN PRJ - 3-MILE/WEID CANAL SCR	Sue Knapp
3:45	8343600	UMATILLA PASSAGE O&M	Jay Marcotte
3:45	8902700	POWER/REPAY O&M FOR USBR CPR PUMPING PROJ	Jay Marcotte
4:W	9601100	JUVENILE FISH SCREENS AND SMOLT TRAPS AT IRRIGATION DIVERSION DAMS ON THE WALLA WALIA AND TOUCHET RIVERS IN OREGON AND WASHINGTON	Gary James
4:W	9601200	ADULT ANADROMOUS FISH PASSAGE IMPROVEMENT AT IRRIGATION DIVERSION DAMS ON THE WALLA WALLA RIVER	Gary James
4:oo	6604600	RIPARIAN AND FISH HABITAT ANALYSIS, PROTECTION AND ENHANCEMENT TO INCREASE NATURAL PRODUCTION OF STEELHEAD AND SPRING CHINOOK IN THE WALLA WALIA RIVER BASIN	Gary James

Time	Project #	Title	Presenter(s)
4:15	9606400	WALLA WALLA COUNTY COOPERATIVE WATERSHED PLAN (DEVELOPMENT AND IMPLEMENTATION)	Mark Taylor
	9308800	OREGON FISH SCREENS PROJECT (POSTER)	Roy Elicker
SESSION 3		**Hatchery Research** Session Chair: Steve Schroder, WDFW	
1 :00		Introduction to Session - Steve Schoder	
1:05	8909801	SALM SUPPLEMENTATION STUDIES IN IDAHO RIVERS - USFWS	Anne Rockhold
1:05	8909803	SALMON SUPPLEMENTATION STUDIES IN ID RIVERS - SHOSHONE-BANNOCK TRIBES	Chris Reighn
1:05	8909800	IDAHO SUPPLEMENTATION STUDIES (ISS)	Doug Nemeth
1:05	8909802	SALMON SUPPLEMENTATION STUDIES IN ID RV - NEZ PERCE TRIBE	Jay Hesse
1:35	9102900	LIFE HISTORY OF FALL CHIN IN SNAKE RIVER BASIN	Billy Connor, Dennis Rondorf
2:05	9005200	PERF/STOCK PROD IMPACTS OF HATCHERY SUPPL	Reg Reisenbichler
2:30		BREAK	
2:40	9202200	WILD SMOLT BEHAVIOR/PHYSIOLOGY (ESA)	Walt Dickoff
4:05		BREAK	
4:15	9506405	DEV. OF A NATURAL REARING ENHANCEMENT SYS. (NATURES) FOR INCREASING HATCHERY-REARED SALMON POST-RELEASE SURVIVAL	Desmond Maynard
4:40	9105500	SUPPLEMENTATION FISH QUALITY	Steve Schroder
	8903000	EFFECTS OF ACCLIMATION ON THE SURVIVAL OF SPRING CHINOOK SALMON AKA: EVAL OF PRE-REL TEMP ACCLIMATION AT KLICKITAT HTCH	Andrew Appleby
		MARCH 27, 1997 - 6 AM TO NOON	
SESSION 1		**Upper Columbia Projects** **Session Chair:** Jason Scott, KT	
		Washington Panel Discussion	
8:00	5503500	RESIDENT FISH STOCK STATUS ABOVE CHIEF JOSEPH AND GRAND COULEE DAMS	Jason Scott
8:20	9404300	LAKE ROOSEVELT MONITORING / DATA COLLECTION PROGRAM	Keith Underwood
8:40	9501100	CHIEF JOSEPH KOKANEE ENHANCEMENT PROJECT	Kirk Truscott
8:40	9001800	HABITAT IMPROVEMENT - LAKE ROOSEVELT	Kirk Truscott
8:40	8503800	COLVILLE TRIBAL FISH HATCHERY	Kirk Truscott
9:w	9104700	SHERMAN CREEK HATCHERY - O&M	John Kerwin
9:50		BREAK	
		Idaho Panel Discussion	
10:00	8709900	DWORSHAK DAM IMPACTS ASSESSMENT	Melo Maiolie
10:00	8740700	DWORSHAK IMPACTS/M&E & BIO-INT RULE CURVES	Melo Maiolie
10:00	9404700	LAKE PEND OREILLE FISHERY RECOVERY	Melo Maiolie
10:35	8709900	DWORSHAK DAM IMPACTS ASSESSMENT	Dave Statier
10:35	8740700	DWORSHAK IMPACTS/M&E & BIO-INT RULE CURVES	Dave Statler
SESSION 2		**Production - Upper Mid Columbia Subregion** Session Chair: Lynn Hatcher, YIN	
6:00		Introduction - Lynn Hatcher	
8:05	8812001	YAKIMA/KLICKITAT FISHERIES PROJECT MANAGEMENT POLICY/TECHNICAL INVOLVEMENT AND PLANNING FOR YKFP	Mel Sampson, Steve Leider
8:15		PROJECT SUMMARY STATUS	David Fast
8:25	5522100	DEVELOPMENT AND REFINEMENT OF NATURAL PRODUCTION OBJECTIVES AND ENHANCEMENT STRATEGIES FOR YAKIMA BASIN ANADROMOUS SALMONIDS	Bruce Watson, Joel Hubble

Time	Project #	Title	Presenter(s)
8:40	8812008	FISHERIES TECHNICIAN FIELD ACTIVITIES	Mark Johnston
8:50	8812005	FISH PASSAGE VIDEO MONITORING	Joel Hubble
9:oo		BREAK	
9:10	9506402	UPPER YAKIMA SPECIES INTERACTION STUDIES	Todd Pearsons
9:25	9598401	REFINEMENT OF MARKING METHODS FOR YKFP	Curtis Knudsen
9:40	5507700	MONITORING OF SUPPLEMENTATION RESPONSE VARIABLES FOR YKFP	Craig Busack
9:55	9506800	KLICKITAT PASSAGE/HABITAT PRELIMINARY DESIGN	Bill Sharp
10:10	8811580	YAKIMA HATCHERY - CONSTRUCTION	Jarvis Burton
10:25	9006900	YAKIMA HATCHERY - FINAL DESIGN	Robert Gatton
10:40		BREAK	
10:50	9603201	HANFORD K-BASIN FALL CHINOOK ACCLIMATION AND MASTER PLAN DEVELOPMENT	Nick Anderson
11:05	5503800	1996-97 EVALUATION OF JUVENILE FALL CHINOOK STRANDING ON THE HANFORD REACH	Paul Wagner
11:25	9803391	YAKIMA RIVER FALL CHINOOK SUPPLEMENTATION	Tom Scribner
11:40	9803302	YAKIMA RIVER COHO RESTORATION	Tom Scribner
11:40	9604000	WENATCHEE AND METHOW RIVER COHO RESTORATION	Tom Scribner
SESSION 3		**Mainstem Research, Monitoring & Evaluation** Session Chair: Mike Schiewe, NMFS	
8:00		Introduction - Michael Schiewe	
8:05	8712700	SMOLT MONITORING PROGRAM	Michele DeHart, Thomas Berggren, Margaret Filardo
8:25	8740100	TRAVEL TIME AND SURVIVAL SMOLT PHYSIOLOGY	Akc Maule. Robin Schrock, John Beeman, Karen Hans, Philip Haner, Jack Hotchkiss
8:45	9109100	RUN TIMING PREDICTIONS COLUMBIA RIVER BASIN	John Skalski. Rich Townsend, Antonio Periz-Comas, Dean Yasuda, Peter Wesfhagen, Kristen Ryding
9:05	8910700	EPIDEMIOLOGICAL SURVIVAL METHOD	John Skalski, Jim Lady; Antonio Perez-Comas, Alan Lowther
9:25	9302900	'SURVIVAL ESTIMATION FOR DAM/RESERVOIR PASSAGE	William Muir, Steven Smith, John Williams, Eric Hockersmith, Stephen Achord
9:50		BREAK	
10:00	9802999	1997 HATCHERY PIT TAG STUDY	Howard Schalter, Charlie Petrosky
10:20	9802100	GAS BUBBLE DISEASE MONITORING AND RESEARCH OF JUVENILE SALMONIDS	Alec G. Maule, John Beeman, Matthew Mesa
10:40	9300802	SYMPTOMS OF GAS BUBBLE TRAUMA INDUCED IN SALMON BY TOTAL DISSOLVED GAS PRESSURE SUPERSATURATION IN THE SNAKE AND COLUMBIA RIVERS	Tom Backman
11:00	9802400	CHANGES IN GAS BUBBLE DISEASE SIGNS AND SURVIVAL OF MIGRATING JUVENILE SALMONIDS EXPERIMENTALLY EXPOSED TO SUPERSATURATEDGASES	Randall Absolon, Bruce Monk, Earl Dawley
11:20	9802200	EVALUATING EFFECTS OF DISSOLVED GASES ON RESIDENT FISH	Brad Ryan, Boyd Schrank, Earl Dawley
11:40	9204101	EVALUATION OF ADULT SALMON AND STEELHEAD MIGRATION PAST DAMS AND THROUGH RESERVOIRS IN THE LOWER COLUMBIA RIVER AND INTO TRIBUTARIES	R. Dach, T. Bjomn, L. Stuehrenberg, K. Tolotti, R. Ringe, C. Peery, M. Feeley, J. Vella
12:00	5505900	AVIAN PREDATION OF JUVENILE SALMONIDS ON THE LOWER COLUMBIA RIVER	Dan Roby, Ken Collis

Columbia River Basin Watershed Restoration Activities: 1996 and 1997 Funding

SPONSOR/CONTRACTOR:
Mary Lou Soscia/Megan Callahan, Columbia River Inter-Tribal Fish Commission (503/238-0667)

GROUP:
Anadromous Fish

ABSTRACT:
Regional fish managers recognize the important role of local watershed groups in accomplishing habitat restoration in the Columbia Basin, and the need to include local and private interests in decision making on a watershed level. The Columbia River Basin Fish and Wildlife Program calls for the development of a "subregional approach" to identifying, funding and implementing habitat activities.

There are six subregions in the Columbia Basin: 1) Lower Columbia (below Bonneville Dam); 2) Lower Mid-Columbia (Bonneville Dam to the Snake River); 3) Upper Mid-Columbia (Snake River to Chief Joseph); 4) Upper Columbia (above Chief Joseph Dam); 5) Lower Snake (mouth of the Snake River to Hells Canyon Dam); and 6) Upper Snake (above Hells Canyon Dam). A subregional structure would perform two main functions: 1) to prioritize habitat activities for fish and wildlife, and 2) to encourage and support watershed approaches to habitat protection and-restoration. Under a subregional approach, federal, state and tribal fish managers would interact with local watershed representatives on a subregional team. The team would make decisions about how to implement regional fish and wildlife goals in ways that address local needs and concerns. The subregional team would also provide technical support to watershed efforts and a vehicle for the development of watershed partnerships.

Staff resources (at minimum a regional coordinator, subregional coordinators, and support for watershed coordinators) would be required to support and guide a subregional process.

5503500

Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams

SPONSOR/CONTRACTOR:
Keith Underwood, Spokane Tribe (509/258-7020)

GROUP:
Resident Fish

ABSTRACT:
The Resident Fish Stock Assessment Project (NWPPC measure number 10.8B.26) was designed jointly by the Kalispel Tribe of Indians, Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, and Washington Department of Fish and Wildlife. The long-term goals of the project are to coordinate past and current resident fish activities in the blocked area, thus allowing managers the ability to manage the blocked area as an ecosystem. Construction of a common GIS storage and analysis database will allow each agency to input and access information. A common database allows an agency to determine the feasibility of a project based on information collected upstream and downstream from the project site. Currently each agency uses management strategies designed relatively independently of other agencies. Local managers will cooperate with upstream and downstream managers, thus maximizing enhancement and protection efforts. Ultimately the project will more effectively manage game fisheries while improving and enhancing the integrity of the native populations.

The project has been designed in phases. The planning phase will be conducted in 1997 and will be the organizational phase of the project. Phase 1, in 1998, will be the actual design and constructton of a common database. Phase 2, 1999-2001, will be to assess data, fill data gaps, and recommend management efforts. J Phase 3 will be an ongoing phase to implement recommendations and to monitor and evaluate project recommendations.

Kalispel - Pend Oreille Wetlands 100 Acre Extension

SPONSOR/CONTRACTOR:
Ray Entz, Kalispel Tribe of Indians (5091445-l 147)

GROUP:
Wildlife

ABSTRACT:
This project was initially scoped in 1993 by the Kalispel Tribe and submitted to the Northwest Power Planning Council's amendment process in 1994 under the wildlife rule I I .3F. 1. It was ranked as the number two project through the FY 1996 CBFWA Wildlife Managers Caucus process and allocated funding for FY 1996. The Kalispel Tribe of Indians' Pend Oreille Wetlands Wildlife Mitigation Phase II project is a 164-acre floodplain addition to be purchased and managed in concert with the existing mitigation project in 1997. This project will benefit seven priority target species for losses associated with the construction of Albeni Falls Dam. The species used as indicators for habitat cover type enhancement are Bald Eagle (breeding and wintering), Black-capped Chickadee, Yellow Warbler, Mallard, Canada goose, muskrat, and white-tailed deer. The project site is located in northeastern Washington along the Pend Oreille River and adjacent to the northern boundary of the Pend Oreille Wetlands Phase I project. It is an essential corridor and connection area along the Pend Oreille River. The project site is adjacent to a 20-acre US Forest Service land holding and 70-acres of county land. This public land has the possibility to be enhanced and managed to benefit target species. A potential of 300 H.U.'s are expected to be credited to BPA as the project provides, at a minimum, about 200 protected H.U.'s and over 100 H.U.'s to be credited through enhancements. This project includes six distinct habitat types with at least one target species associated with each. Habitat types include black cottonwood riparian forest, cedar forested wetlands, open water wetlands, scrub-shrub wetlands, mixed coniferous upland forestand floodplain meadow. Enhancement funding will continue through 2002 in concordance with the existing project to complete riparian restoration/reforestation, pasture enhancements, upland mixed coniferous forest management, scrub-shrub wetland restoration, and ongoing monitoring, evaluation, operations and maintenance. All management activities are consistent with and complimentary to the goals and objectives in the Kalispel Natural Resource 'Department's Fish and Wildlife Management Plan.

5 5 0 3 8 0 0

1996-97 Evaluation of Juvenile Fall Chinook Stranding qn the Hanford Reach

SPONSOR/CONTRACTOR:
Paul Wagner, WDFW (509/734-7101)

GROUP:
Anadromous Fish

ABSTRACT:
The Hanford Reach is the last free-flowing stretch of the Columbia River and supports a large and important population of wild fall chinook. Losses of juvenile fall chinook rearing in this area have resulted from river level fluctuations due to power peaking generation at hydroelectric projects. Pacific Northwest National Laboratories (PNNL) attempted to assess this during the last 1970's, but the work was largely qualitative. Elsewhere, ramping studies have been conducted on major salmon producing rivers and ramping restrictions have been implemented to minimize fish losses. This project will assess juvenile chinook mortality on the Hanford Reach resulting from hydroelectric power generation changes. Information will also be collected regarding the effect on other fish species and the benthic community.

During the first year (1997), a study coordination group consisting of representative members of all coordinating and affected parties will be assembled to review the work and develop mutually agreeable methodologies. The first year will be a pilot evaluation to assess and classify the habitat present on the Hanford Reach at various flow levels and to establish transects, sampling sites, and the statistical-parameters. This will be done in cooperation with the United States Geological Service Biological Resource Division (BRD) Columbia River Research Laboratory located in Cook, Washington, where an evaluation of juvenile chinook rearing on the Hanford Reach is ongoing. The general approach will be to identify primary juvenile Chinook production and rearing areas, divide these areas into transects based upon habitat type, and establish index sampling sites within each transect. Sampling to assess anadromous and resident fish stranding and entrapment will be conducted throughout the spring and summer under normal power peaking operations at Priest Rapids Dam. This will be done to help define the duration and spatial extent of the problem. Two controlled river elevation reduction tests will also be conducted. Specific scheduling of these sampling activities will require the use of an unsteady flow model to'be provided by PNNL for determination of the discharge/stage relationship, as well as close coordination with GCPUD personnel and the study coordination group. Benthic work during the first year will be conducted by the University of Idaho and SPC and will consist of literature review and development of a study plan to evaluate the effects of power peaking on the benthic community in the Hanford Reach in 1998. Limited habitat mapping will also be conducted in conjunction with BRD personnel. The objectives of the 1997 work will be to: 1) identify and classify habitat; 2) identify sampling sites; 3) develop a plan to assess the effects of power peaking on the benthic community; 4) conduct limited sampling activities under normal power peaking operations as-well as under controlled river elevation reductions to determine the logistics and limitations of full scale sampling under controlled river elevation reduction tests scheduled to begin in 1998; and 5) determine specific schedules for controlled river elevation reductions tests.

During the second year (1998), the river level will be drawn down on specific test dates to simulate real

power peaking flow reductions. Field crews will collect information from sunrise to sunset at multiple sampling sites on each test day. The information collected will pertain to the physical attributes of each index area as well as biological data. The number of fish stranded on the unwatered substrate surface will be counted directly, while extrapolated estimates will be made of the number of fish trapped beneath the sub-strate surface or in pothole depressions. Complete quantitative assessment of fish losses resulting from predation during the test periods is beyond the scope of this study. Information regarding terrestrial, avian, and aquatic predator activity will be documented, but will be largely qualitative. Quantitative assessment of the impact of predatory fish on juvenile salmonids may be included in a separate study to be conducted by the BRD in the Hanford Reach in 1998. A full scale assessment of the effect of river elevation fluctuations on the benthic community is planned for 1998, but is dependent upon the formulation of a viable plan in 1997. Habitat mapping in coordination with USFWS and BRD personnel will also be conducted. Development of a GIS susceptibility model in coordination with USFWS, BRD, and PNNL is also planned. This study is funded by the Bonneville Power Administration and the Grant County Public Utility District.

5504200

1996 Pittsburg Landing O&M and M&E Funding

SPONSOR/CONTRACTOR:
Edouard J. Crateau, USFWS (208/334- 1963)

GROUP:
Anadromous Fish

ABSTRACT:
Yearling fall chinook salmon from Lyons Ferry Hatchery will be reared at the Pittsburg Landing acclimation facility. The fish will be acclimated in the temporary facility for four to six weeks before release into the Snake River in late April, 1996. Similar operation with up to 150,000 fish is also scheduled for 1997 and 1998.

The Pittsburg Landing site was selected because of the proximity of spawning habitat for returning adults and because of good road access. Fall chinook salmon are known to successfully spawn and rear in the free-flowing Hells Canyon portion of the Snake River (Garcia et al. 1994).

*** Text taken from Short Description field in 1997 B**

Habitat Enhancement & Protection - Shoshone-Paiute Reservation

SPONSOR/CONTRACTOR:
Walden Townsend, Shoshone-Paiute Tribes (702/757-3211)

G R O U P :
Resident Fish

-ABSTRACT:
The habitat enhancements for the Duck Valley Indian Reservation are needed in order to help recover and protect existing stocks of native cutthroat trout, redband trout, bull trout, and rainbow trout that are located in the reservoirs and streams of the Duck Valley Reservation. The reservoirs also provide a subsistence fishery for the people of the reservation through a stocking program as well as economic development from the sale of licenses to non-Indians coming here to fish.

Included with the above, the habitat enhancement project calls for an intensive reservoir and stream study on the reservation. The two reservoirs will be sampled intensively to determine the density of fish available, this will help our stocking program so we know what fish are already in the reservoir and how many fish we need to be stocking each season. Along with the fish survey an intense limnological survey will be conducted on both Sheep Creek and Mt. View Reservoirs. To date only a moderate survey has been done on these bodies of water. The Owyhee River and its tributaries will also be surveyed on the reservation. This survey will gain information on what native species of fish are present on the reservation. Aside from a less than intensive survey by Kleinfelders, Inc. and the US Fish and Wildlife Service, no studies have been done on the river or its tributaries. It is our hope to see if redband trout and bull trout are present in native forms and weather there is a reproducing population. Very little work has been done on the redband trout in this area and as this species is unique in its ability to survive in warm water temperatures and lower dissolved oxygen than the rainbow trout, any information gathered may be important to future work on the reservation and in other areas that may support the redband trout. The bull trout is a species of concern in Idaho and the information learned from the work this summer will be important to helping scientists understand a little more about where the bull trout can live and reproduce.

5505900

Predation by Fish-Eating Birds on Juvenile Salmonids, in the Columbia River Basin

SPONSOR/CONTRACTOR:
Daniel D. Roby, Oregon State University/CRITFC (5031737-1955)

GROUP:
Anadromous Fish

ABSTRACT:
Fish-eating birds may have a significant impact on survival of juvenile, salmonids in the mainstem Columbia River. Regional plans for Snake River salmon recovery have emphasized avian predation on smolts as an area needing further investigation. This new research project will (1) determine diet composition of colonial fish-eating birds in the lower Columbia River (i.e, double-crested cormorants, Caspian terns, California gulls, ring-billed gulls, glaucous-winged gulls), (2) use bioenergetics modelling to estimate the numbers of juvenile salmonids consumed by colonial waterbirds, (3) use radio telemetry techniques to identify conditions and locales where avian predation is most prevalent, (4) provide recommendations to mitigate predation by fish-eating birds, and (5) evaluate the efficacy of control measures that are implemented.

In the pilot year of this 5-year project, we identified the location and size of piscivorous waterbird breeding colonies on the lower Columbia River, gathered published and unpublished data in order to assess population trajectories at these colonies, and surveyed for salmon PIT tags at the large Caspian tern breeding colony at Rice Island in the Columbia River estuary. The results of the PIT tag survey indicated that over 15,000 tags have been deposited by Caspian terns at the Rice Island colony during the last 7 years, but most tags were deposited in the last two years. This suggests that the terns nesting at this one colony are consuming large numbers (probably millions) of smolts annually.

The Rice Island tern population represents only a small fraction (ca. 11%) of the total number of fish-eating birds nesting in the lower Columbia River. Also, like most other waterbird colonies in the lower Columbia River, this population has grown dramatically in recent years (from 1,100 pairs in 1984 to 8,100 pairs in 1996). Consequently, system-wide losses of juvenile salmonids to avian predators are likely to be substantial and increasing.

Monitoring Fine Sediment Levels insubstrate and Overwinter Sedimentation in Cleaned Gravels in Portions of the Grande Ronde and John Day Rivers

SPONSOR/CONTRACTOR:
Jonathan Rhodes, Columbia River Inter-Tribal Fish Commission (503/731-1307)

GROUP:
Anadromous Fish

A B S T R A C T :
Elevated sedimentation is one of the most pervasive problems in natal salmon habitat in the Columbia River basin. Monitoring will take place in spawning habitat in tributaries of the Grande Ronde and John Day rivers with differing levels of land use. Surface fine sediment levels will be measured at the onset of the incubation period for spring chinook. Overwinter sedimentation will be measured by placing solid-walled containers filled with cleaned gravels in'areas excavated to resemble redds at the onset of the incubation period and collecting the containers at the end of the incubation period for particle size analysis. The relationship between surface fine sediment and overwinter sedimentation will be investigated. Salmon survival from egg to fry will be estimated using published relationships between fine sediment levels and salmon survival. The project results will supply information that can be used to determine: trends in fine sediment (as an index of the quality of spawning habitat); the need for watershed restoration; and estimated trends in salmon survival in natal habitat.

Some aspects of the project monitoring have been undertaken without funding over the past few years, yielding preliminary results, including: over-winter sedimentation in cleaned gravels occurred consistently, but at variable levels, in all monitored reaches; sedimentation in cleaned gravels is greatest in streams where surface fines are highest; and surface fine sediment levels have increased in monitored reaches in the Grande Ronde River since 1992.

5506100

Hydro Regulator Model Development

SPONSOR/CONTRACTOR:
Tom Cross, Columbia River Inter-Tribal Fish Commission (503/238-0667)

GROUP:
Anadromous Fish

ABSTRACT: *
The Hydro Regulator is a PC based model capable of modeling dam operations in the Columbia and Snake Rivers allowing the operator to perform independent analysis of various flow and storage criteria and plot comparitive studies.

* Text taken from Short Description field in 1997 B

Evaluation of Watershed and Habitat Response to Recent Storms: Effects on Salmon Listed Under the Esa

SPONSOR/CONTRACTOR:
Jonathan Rhodes/F.Al Espinosa, Columbia River Inter-Tribal Fish Commission (503/73 l-1307)

GROUP:
Anidromous Fish

ABSTRACT:
The storm events during the past two winters in the Snake River Basin provide a critical opportunity to test the untested hypothesis that is the current premise for land management in watersheds with the most important remaining natal habitats for salmon: the NMFS and the USFS have assumed that incremental improvements in land management actions will result in improved natal salmon habitat conditions. This proposal will test this hypothesis by evaluating and comparing the effects of recent storms and floods in managed watersheds with the effects in watersheds with little or no anthropogenic-disturbance. This evaluation is critical because the long-term consequences of land management on habitat conditions and resultant salmon survival are often not completely expressed until triggered by storms and floods. The project will also test the following hypotheses that have major ramifications for efforts to increase the survival of anadromous fish in natal habitat: 1) Watersheds with greater magnitude of land disturbance responded differently to the storm/flood events than watersheds with a lesser magnitude of land disturbance; 2) Salmon habitats in watersheds with a greater magnitude of land disturbance, responded differently to the flood events than those in watersheds with a lesser magnitude of land disturbance; and 3) Specific types of land disturbance (e.g. types of roads) responded differently to the storm/flood events.

Two or three drainage basins in the Interior Columbia Basin will be selected for study of watershed and habitat responses to the recent storm/flood events. In each selected study basin, smaller watersheds that have had different levels of anthropogenic land disturbance will be selected for intensive investigation of watershed and habitat responses to the storm events. The smaller watersheds selected from each study drainage basin will be nested in a paired treatment study design (e.g., significantly logged and roaded "treatment" versus pristine or relatively unaltered "treatment"). Monitoring within the selected watersheds will be structured to identify: mass failures and zones of large-scale channel change in watersheds; the type of land use associated with mass failures; habitat response to the storms and its likely effects on anadromous fish survival.

Aerial overflights and on-the-ground investigations in each watershed will be used to determine the frequency and volume of mass failures associated with various types of land use. In each watershed: critical reaches of anadromous fish habitat will be inventoried in each watershed to determine the current condition of key habitat attributes that shape anadromous fish survival, such as pool frequency and substrate. Current habitat conditions will be compared to pre-storm habitat surveys and aerial photos to evaluate changes in habitat conditions and egg-to-smolf survival caused by the storm/flood events.

The study will provide information that can be used to: check the veracity of current assumptions regarding watershed and habitat management, target degraded habitat attributes in specific watersheds

requiring recovery, and prioritize regional and sub-regional watershed restoration measures needed to improve egg-to-smolt survival for those badly depressed and declining anadromous fish stocks in the Snake River Basin.

Grande Ronde Subbasin Watershed Restoration

SPONSOR/CONTRACTOR:
Rick George, CTUIR (541/276-3449)

GROUP:
Anadromous Fish

ABSTRACT: *
Conduct watershed planning and education process by identifying problems and developing creative solutions to land use problems impacting water quality/quantity in the Grande Ronde Basin. Implement instream, riparian and wetland enhancement projects for benefits to summer steelhead, spring chinook, and wildlife.

5507300

Hardy Creek Chum Salmon Spawning Habitat Improvement Project

SPONSOR/CONTRACTOR:
Donna Allard, USFWS (360/696-7605)

GROUP:
Anadromous Fish

ABSTRACT:
Historically, the Columbia River supported populations of chum salmon above Bonneville Dam as far upstream as the Walla Walla River. Those spawning areas have been inundated by dam construction and at present, fewer than 200 chum salmon pass Bonneville Dam each year. Hardy Creek supports one of only three populations of chum salmon being monitored in the lower Columbia River basin. These populations are listed as stocks considered at moderate risk of extinction. The Service has monitored salmon escapement in Hardy Creek since 1984. Since that time, increase in the amount of reed canarygrass and sedimentation has compromised the quality of spawning habitat in much of the creek. Recent high water years has'also contributed to the degradation of spawning habitat due to Hardy Creek's location 4 miles downstream of Bonneville Dam. This project is examining the extent of changes in the channel profile, bed composition and spawning habitat of Hardy Creek resulting from sediment transport and deposition while monitoring the biological and physical characteristics of Hardy Creek. Sources of sediment deposition in the watershed will be identified and management alternatives and improvement measures designed to alleviate the problem will be evaluated and implemented.

Monitoring of Supplementation Response Variables for YKFP

SPONSOR/CONTRACTOR:
Bill Hopley, WDFW, (360/902-2749)

GROUP:
Anadromous Fish

ABSTRACT:
A major accomplishment of YFP planning in 1996 was development of a spring chinook monitoring plan. Work began on the plan with the recognition that the spring chinook program has two distinct experimental tiers: 1) performance of the supplementation effort, and 2) relative performance of OCT and NIT fish. We then developed high-level questions to be answered by monitoring for each experimental tier:

1) How is YFP spring chinook supplementation performing in terms of
a) increasing harvest opportunity; b) increasing natural production;
c) limiting genetic impacts; and d) limiting ecological impacts

2) How do the NIT and OCT treatments compare to each other in terms of
a) juvenile survival and associated traits, relative to wild fish; b) adult returns to fishery and spawning grounds, relative to wild fish; c) reproductive performance and associated traits, relative to wild fish; and d) juvenile ecological interactions with wild fish

The resulting monitoring plan is organized into three sections, with one section having four substantial component sections, as shown below. The -1996 version of the monitoring plan is conceptually complete, stating what should be monitored and why. Still being developed are detailed analytical methods and logistical protocols. These elements can only be developed after analysis of statistical power and logistical and financial feasibility, and after resolution of some uncertainties about monitoring facilities.

5508600

Stinkingwater Salmonid Project

SPONSOR/CONTRACTOR:
Linda J. Reed, Bums Paiute Tribe (541/573-2088)

GROUP:
Resident Fish

ABSTRACT:
This project is focused on studying the life history of redband and bull trout in the Middle Fork and tributaries of the Malheur River. Surveys and inventories will be designed to describe the distribution and population characteristics of bull trout and redband throughout the Malheur river drainage. Sampling techniques will depend on size of stream, but the methods will consist of either electrofishing or snorkeling. Habitat inventories will be conducted similar to Hankin and Reeves 1988., to identify deficiencies in habitat and habitat requirements. We will determine the presence of hybrid or exotic species, and if found, initiate a comprehensive genetic assessment via sampling of native redband and bull trout. Human impacts as well as stream manipulations and use will be assessed. HOBO water temperature instruments and HACH Kits will be used to monitor temperature and water quality. Project personnel will work closely with ODFW, Forest Service and BLM to coordinate data gathering and to standardize our survey techniques and methods.

Methow Basis Side Channel Habitat Construction

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
Create side channel habitats for spring chinook salmon in the Methow Basin by excavating new channels and re-connecting existing channels to the mainstem Methow River and its larger tributaries.

Yakima River Basin Side Channel Survey and Rehabilitation

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
Survey the basin by remote sensing, with ground-truthing where necessary, to locate abandoned and seasonally dewatered areas. Develop prescriptions for rehabilitation to prevent juvenile stranding.' Where feasible, write restoration prescriptions to reconnect abandoned channels, to increase rearing habitat.

* Text taken from Short Description field in 1997 B

Cabin Creek Habitat Enhancement Project

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
The project entails the introduction of large trees with attached root wads and boulders into a stream channel that is totally devoid of roughness elements that create pools and velocity refuge for fish. Planting of riparian vegetation in areas devoid of vegetation or exhibiting bank erosion is also planned. The project is located approximately 1.5 miles northwest of Easton, Washington.

*** Text taken from Short Description field in 1997 B**

5510800

Upper Yakima Tributary Irrigation Improvement

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
Surface diversions off Little Creek, Big Creek, Swauk Creek, Taneum Creek, Manastash Creek and the Teanaway River dewater the lower channels, or cause flows to decrease to the point that fish cannot access habitat above the diversions. This project would focus on converting surface-diversions to wells, or reducing conveyance loss when most cost-effective.

* Text taken from Short Description field in 1997 B

Teanaway River Instream Flow Restoration

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
Restoration of instream flows in the Teanaway River through the lease or purchase of land and water rights.

*** Text takenfrom Short Description field in 1997 B**

5511300

Little Naches River Riparian and In-Channel Habitat Enhancement Project

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
The project entails revegetation of degraded riparian areas and eroding stream banks, and restoration/enhancement of deficient in-channel habitat features such as large woody debris, pool area, velocity refugia, and escapement and hiding cover. Construction of barriers or exclosures along the river is also anticipated with this project to allow recovery of the riparian and stream channels. The project is located approximately six to twelve miles above the town of Cliffdell in Yakima County. All identified restoration work would be along, or in, the mainstem of the Little Naches River.

*** Text taken from Short Description field in 1997 B**

Yakima Basin Side Channels

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
The project entails revegetation of degraded riparian areas and eroding stream banks, and rehabilitation of braided stream channels and side channel rearing habitat. Placement of wood and boulders in the side channels may be necessary to provide hiding and escape cover. Revegetation of adjacent riparian corridors is also sorely needed due to past diking, housing development, recent floods, and conversion of lands to pasture and agriculture. Some level of exclosure fencing and land acquisition is also anticipated to allow recovery of the riverine habitat. The project is located between the towns of Gleed and Naches in Yakima County and includes side and overflow channels of the Naches River.

*** Text taken from Short Description field in 1997 B**

5 5 1 1 7 0 0

Yakima River Rearing Habitat Enhancement, Between Selah and Union Gaps

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
Much of the Yakima and lower Naches River was diked and channelized by the Army Corps of Engineers after the 1933 flood. Impacts from diking included loss of side channel and alcove habitat by filling and channel down cutting, lost floodplain storage, increased channel velocities and loss of riparian vegetation. The project would focus on reestabfishing side channel and alcove habitat, improving existing velocity cover by building deflectors and adding large woody debris, and restoring riparian habitat by planting native riparian vegetation.

*** Text taken from Short Description field in 1997 B**

Toppenish/Simcoe Instream Flow Restoration

SPONSOR/CONTRACTOR:

Lynn Hatcher, Yakama Indian Nation (509/865-6262)

G R O U P :

Anadromous Fish

ABSTRACT: *

Restoration of instream flows in Toppenish and Simcoe creeks through the lease or purchase of land and water rights, or substitution of water sources.

Upper Klickitat Meadows Riparian Restoration

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
In general this project would increase fish habitat by restoring the function of the meadow habitat. Riparian bank stabilization and cattle exclusion fencing would create a better pool/riffle habitat, and reduce aggradation of the system. Restoration of fish habitat in the upper Klickitat River would be done by, creating pools and providing bank cover in meadow areas mostly by allowing natural aggradation processes to take place. Rehabilitation of the upper Klickitat must entail (1) exclusion of cattle, (2) stabilization of streambanks, and (3) making the channel narrower and higher (aggradation) by trapping sediment from upstream.

The Yakama Nation has recently adopted a new grazing policy which will discontinue grazing within the Klickitat River valley above the confluence with Diamond Fork Creek. This incorporates the high mountains meadows

*** Text taken from Short Description field in 1997 B**

Klickitat Basin Culvert Rehabilitation-

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
In general these projects would increase anadromous and resident fish habitat'(i.e. spawning &juvenile rearing) and provide an improved up/downstream migration corridor. Conduct engineering surveys and use results to modify improper culverts. -This could take the form of repair, replacement, and/or installing baffles within existing culverts to allow for passage.

*** Text taken from Short Description field in 1997 B**

Lower Klickitat River Riparian and In-Channel Habitat Enhancement Project

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
The project entails revegetation of degraded riparian areas and eroding stream banks, and restoration/enhancement of in-channel habitat features such as large woody debris, spawning gravel, pool area, velocity refugia, and escape and hiding cover (spawning, rearing and holding). Some level of exclosure fencing, irrigation modification, and land acquisition is also anticipated to allow recovery of the stream systems. The project is located in the vicinity of the towns Klickitat, Wahkiakus, and Glenwood in Klickitat County. Streams identified in the project work include Wheeler Canyon, Swale Creek, Little Klickitat River, Mill Creek, Bowman Creek, Summit Creek, White Creek and Trout Creek.

*** Text taken from Short Description field in 1997 B**

ESA Recovery Implementation Coordination

SPONSOR/CONTRACTOR:
Brian Allee, CBFWF (503/326-703 1)

GROUP:
Anadromous Fish

ABSTRACT: *
The project is intended to assist with the planning, coordination and facilitation of the implementation of the Proposed Recovery Plan for Snake River Salmon. An essential component is the coordination among the fisheries co-managers and the operating agencies with respect to reservoir operations and the hatchery and other fish and wildlife mitigation programs.

Lower Snake River Naturalization

SPONSOR/CONTRACTOR:
Keith Kutchins, Shoshone-Bannock Tribes (208/238-3900)

GROUP:
Anadromous Fish

ABSTRACT:
From 1961 through 1975 four dams were constructed in the lower Snake River (Ice Harbor, Lower Monumental, Little Goose and Lower Granite'dams) in order to provide in-river commodities transportation to Lewiston, Idaho, to produce electricity, and to provide reservoir-related recreation opportunities. In the 25 years since completion of the lower Snake River projects, at least one anadromous fish species has gone extinct (coho salmon), another (sockeye salmon) is functionally extirpated and listed as endangered under the federal Endangered Species Act (ESA), two runs of chinook salmon (the fall run and the spring/summer run) are listed as threatened under the ESA, and Snake River steelhead are proposed for listing under the ESA. Mainstem Snake River passage for juvenile and adult anadromous fish is the critical limiting factor for the listed runs of Snake River fish.

Anadromous fish flow augmentations from the large storage reservoirs and upper Snake River prevent those ecosystem objectives from being achieved, at a great cost to the agriculture and recreation communities. The lower Snake River dams generate less than five percent of the region's electricity. Riverine based recreation is no longer existent. Barges transport commodities at a greater cost than alternative forms of trucking and rail. There is no flood control or irrigation storage from the four lower Snake River dams.

The Watershed Equity Team of the Columbia Basin Fish and Wildlife Authority, with assistance from the Northwest Power Planning Council (NPPC) staff, were assigned to determine how the Columbia and Snake river systems could be operated to meet both the upper-river resident fish objectives, and the anadromous fish objectives. Their working paper concludes that the Columbia River system can not be operated to meet both objectives unless the natural river levels in the lower Snake River are restored and John Day Dam is lowered to spillway crest.

Consistent with the conclusions of the WET Working Paper, and consistent with provisions in the 1995 hydrosystem Biological Opinion, this project would finalize the feasibility study and NEPA work in order to obtain congressional authorization for the immediate implementation of restoring the natural river levels in the lower Snake River. The project proposal details the work plan to implement this action.

The fish and wildlife managers did not achieve consensus to implement this project (projected five year cost of $500 million), and desired to modify the project to share $125,000 per year in order to more fully participate in the federal government's existing process. The project sponsor (the Shoshone-Bannock Tribes) does not agree with the federal process, because it requires years more of study that the fish do not have. Thus, the proposal to immediately implement the natural river levels in the lower Snake River remains unmodified.

Salmon River Production Program

SPONSOR/CONTRACTOR:
Keith Kutchins, Shoshone-Bannock Tribes (208/238-3900)

GROUP:
Anadromous Fish

ABSTRACT: *
Continue development and emergency implementation of high priority supplementation projects; including captive broodstock; stock transfers; hatchery practice and facility reform; side stream incubation, rearing and release; and monitoring and evaluation to rebuild naturally producing Snake River chinook salmon and salmon trout.

5519100

Meadow Creek Instream Structure and Riparian Evaluation

SPONSOR/CONTRACTOR:
Paul L. Boehne, USFS (541/962-8521)

GROUP:
Anadromous Fish

ABSTRACT: *

This project proposes to continue the long term assessment of restoration work in Meadow Creek, Grande Ronde River Basin, Oregon. This project was started in 1987 through the PNW Research Station collecting fish population and habitat data on Meadow Creek. The purpose is to assess instream structures and riparian vegetation response to enclosures in improving steelhead-smolt production. BPA funded the project implementation in 1990. BPA also funded two years of monitoring for th6.riparian recovery work in 1992. The project has continued with posttreatment data collection on dmolt outmigration, summer rearing capability and habitat utilization, and riparian recovery rates.

This proposal submits the life history work including spring smolt outmigrant trapping, summer juvenile rearing and habitat capability, assessment of instream structures, summer weir trapping for movement analysis, and fall trapping for determination of winter habitat capability. Riparian vegetation recovery study will include continued assessment of cattle and big game recovery of species, biomass and rates of recovery, and recolonization of species. This project will be conducted primarily by Dr. James Sedell, PNW Research Station, and Dr. J. Boone Kauffman, Oregon State University.

Securing Mitigation Sites for Wildlife in the Columbia Basin of Oregon

SPONSOR/CONTRACTOR:
Greg Sieglitz, ODFW (541/757-4186)

GROUP:
Wildlife

ABSTRACT:
The purpose of this project is to draw on the conclusions and analyses conducted for the Assessing Oregon Trust Agreement Planning Project Priorities Using GAP Analysis, Project No. 95-65 and the Oregon Trust Agreement Planning Project. The former project is evaluating and prioritizing a list of potential mitigation projects identified through the Oregon Trust Agreement Planning Project through 1): determining prioritization criteria; 2) incorporating datasets for the potential mitigation areas as well as other regional and state-wide information into a geographic information system (GIS); 3) assessing the proposed mitigation areas in context with a state-wide coarse filter approach. A short-list will be produced indicating which of the mitigation sites would provide the most benefit to wildlife habitat needs. The proposed project would take this short-list to the local level through in-depth investigation and implementation of the "high priority" sites. Outlines for fee-title acquisition, conservation easements, and other management and enhancement activities would be one product of the project. Perhaps more importantly, activities will focus on securing'lands for wildlife through cooperative arrangements with local parties.

5519500

Willamette River Confluence Mitigation Site

SPONSOR/CONTRACTOR:
Charlie Bruce, ODFW (541/757-4186)

GROUP:
Wildlife

ABSTRACT:
The HEP Analysis and Alternatives Plan will be used as a guide for developing and implementing a site management plan. This plan will be followed and a number of enhancement and implementation tasks will be conducted within the study area. Local and state governments own land within the study area. These land managers have developed management plans that provide for activities which complement the mitigation efforts of this project. Project has surveyed known populations and identified lands necessary to mitigate for these species' losses of habitat due to Willamette basin hydro facilitiies Draft management plan for the Willamette basin was submitted to BPA for review in Jan. 1994.Intensive trapping, marking, and monitoring of western pond turtles was conducted between April 1995 through March 1997 to assess the population distribution, size, habitat use, nesting habitat and overwintering habitat within the limits of this project. A geographic information system (GIS) was developed for the project area and is currently being'used for the development of the HEP and Alternatives plans. Contacts have been made with landowners and governmental agencies that will lead-to cooperative habitat enhancement work for multiple species. A hydrologic study has been conducted which will be used to implement water manipulation projects to enhance wildlife habitat. The habitat improvement projects will result in securing habitat units for the Council's target species to be credited to the losses. Objectives of this project include: 1) develop a management plan for the area; 2) secure enhancement projects that will provide mitigation credits through easements, acquisitions, and cooperative mangement plans; 3) identify future project opportunities to meet mitigation needs; 4) produce historic and current habitat maps for the Willamette Basin in GIS to be used for developing objectives and implementation of currrent and future projects

O'Hara Watershed Restoration

SPONSOR/CONTRACTOR:
Katherine L. Thompson, USFS (208/926-4258)

GROUP:
Anadromous Fish

ABSTRACT: *
This project will involve maintenance and improvement of existing instream structures in a small stream (O'Hara Creek, Selway River subbabsin, Clearwater River basin) supporting at-risk stocks of spring chinook salmon and steelhead trout spawnign and rearing. It will also involve extensive road obliteration within the watershed.

*** Text taken from Short Description field in 1997 B**

5520600

Listed Stock Gamete Preservation

SPONSOR/CONTRACTOR:
Paul A. Kucera, Nez Perce Tribe (2081843-7320)

GROUP:
Anadromous Fish

ABSTRACT:
The Listed Stock Chinook Salmon Gamete Preservation project is a new 1997 project that has just recently been approved by the Northwest Power Planning Council to be funded by the Bonneville Power Administration. Goals of the project are to: 1) preserve the genetic diversity of spring and summer chinook salmon populations at high risk of extirpation through application of cryogenic techniques, 2) establish gene bank locations at independent sites in the short term, and 3) establish a germplasm repository for threatened and endangered Snake River chinook salmon in the long term. Cryopreservation project. goals, salmon populations for sampling, cryopreservation sample sizes and the number of years sampling will occur will be determined. Adult male chinook salmon cryopreservation sample collection would target ongoing conventional hatchery supplementation programs and captive broodstock programs that deal with listed chinook salmon populations. other wild and natural salmon populations that are identified will also be sampled through collection of spawned-out males on the spawning grounds. This project has been reviewed and approved by the salmon managers through the Columbia Basin Fish and Wildlife Authority. Cryopreservation activities, that are ongoing, have already been coordinated with the Oregon Department of Fish and Wildlife, the Idaho Department of Fish and Game and the U.S. Fish and Wildlife Service Lower Snake River Compensation Plan program office.

Listed Stock Adult Escapement Monitoring

SPONSOR/CONTRACTOR:
Paul A. Kucera, Nez Perce Tribe (208/843-7320)

GROUP:
Anadromous Fish

ABSTRACT:
The Listed Stock Adult Salmon Escapement Monitoring project is a new 1997 project that has just recently been approved by the Northwest Power Planning Council to be funded by the Bonneville Power Administration. Purpose of this project is to accurately monitor adult summer chinook salmon spawner escapement into the Secesh River and Lake Creek through use of passive underwater video technology. No trapping or handling of adult salmon would occur as a result of this project and a monitoring and evaluation plan will be implemented. The Secesh River system represents an unsupplemented (control) summer chinook salmon population within the South Fork Salmon River, Idaho. Implementation of this project should allow for collection of accurate abundance-based adult salmon escapement information, determination of adult salmon spawner migration timing, allow determination if traditional index area redd counts provide reliable indices of adult salmon escapement, and provide fisheries managers information on whether recovery actions are meeting adult escapement goals in an unsupplemented summer chinook salmon population. We envision that this project may become an element of the comprehensive monitoring of threatened salmon populations within the Snake River basin. This project has been reviewed and approved by the salmon managers through the Columbia Basin Fish and Wildlife Authority and has been further coordinated with the Idaho Department of Fish and Game, U.S. Forest Service and the National Marine Fisheries Service.

5520900

Wallowa County/Nez Perce Tribe Salmon Habitat Recovery Plan Implementation

SPONSOR/CONTRACTOR:
Don Bryson, Nez Perce Tribe (541/426-0119)

GROUP:
Anadromous Fish

ABSTRACT:
The Wallowa County/Nez Perce Tribe Salmon Habitat Recovery Plan (County/Tribe Plan) was developed by a local ad-hoc committee comprised of the County Court (government), Nez Perce Tribe, Oregon Department of Fish and Wildlife, local landowners (including ranching and timber interests), U.S. Forest Service, Bureau of Land Management, and the environmental committee. The Committee analyzed all watersheds in Wallowa County for habitat problems and ranked the problems as high, medium, or low priority, or as needing study. A list of possible solutions was developed for each problem identified. The committee recognized that watershed health could only be achieved if the watershed was treated as a whole (i.e. from ridge top to ridge top). The committee also recognized that Wallowa County could not save the endangered,salmon runs in the Snake River. The major problems lie outside of the County and therefore outside the purview of the County.

This project is to help implement the County/Tribe Plan. As such, there is close coordination between the County Court and the Tribe on prioritizing expenditures from this project. A Natural Resource Advisory Committee has been established, with an associated technical committee, that reviews issues relating to natural resources and advises the Court. The money from the project is split into three categories: 1) implementation, 2) hardware, and 3) expenses.

Implementation consists of helping to fund projects and associated monitoring that fit the solutions list found in the County/Tribe plan. Streams in the County have been prioritized. High priority streams will be treated first but projects brought in by landowners on lower priority streams will not be ignored. Additional tools available for focusing efforts are: 1) the Wallowa County Eco-system Diagnosis and Treatment analysis funded by BPA, 2) the Properly Functioning Condition Analysis methodology, and 3) the Instream Flow Incremental Methodology study that is being finalized on the Lostine River.

Hardware will consist of equipment that is presently lacking in Wallowa County or is considered to be essential for implementation of the County/Tribe Plan. Examples could be: continuous recording temperature devices, sediment samplers, global positioners, or other types of monitoring equipment.

Expenses will consist of items including but not inclusive& consulting fees, travel, and office expenses. Presently, the Wallowa Soil and Water Conservation District has been paying for secretarial help, postage, and office supplies associated with the Wallowa County Natural Resource Advisory Committee. This fund will now provide for these needs.

The objectives and expected outcomes for this project and associated projects (including BPA projects' 9403900,9202601, and 9402700) are: 1)foster watershed stewardship through education, 2) work with

local landowners to develop habitat projects that will improve watershed conditions, and 3) provide watershed conditions suitable for salmonids in Wallowa County.

5521300

Big Canyon Creek Portable Acclimation/Release Facility

SPONSOR/CONTRACTOR:
R. Ed Larson, Nez Perce Tribe (208/843-7320)

GROUP:
Anadromous Fish

A B S T R A C T :
The purpose of this project is to assist in the recovery and restoration of fall chinook salmon in the Hells Canyon reach of the Snake River through the installation and operation of a portable fish acclimation facility at the Pittsburg Landing boat launch in Idaho. The facility acclimates and releases approximately 150,000 yearling fall chinook from Lyons Ferry Hatchery from early March to mid-April. Operations began with the acclimation of 115,000 fall chinook yearlings in 1996. The yearling salmon (12 fish per pound) are reared in sixteen 20' x 4.5' circular aluminum tanks located on a gravel parking lot near the river bank. Snake River water is pumped at a rate of up to 3.6 cubic feet per second (cfs), or 1600 gallons per minute (gpm), into the tanks and discharged back into the river. A thorough description of construction and installation of the facility is provided in Weller (COE 1995) and Stelle (NMFS 1995). The fish are reared and acclimated in the facility for four to six weeks to a size of approximately 10 fish per pound before release into the Snake River. Fish release procedures are designed to minimize stress and physical harm to the fish by releasing directly from the tanks into the river through eight inch hoses. The Pittsburg Landing site was selected due to its accessibility and because of the proximity of spawning habitat for returning adults; fall chinook salmon are known to spawn and rear in the free-flowing Hells Canyon portion of the Snake River (Garcia et al. 1994). Monitoring and evaluation of juvenile outmigration and adult returns is accomplished cooperatively by WDFW, USFWS and NPT. In 1997 ten thousand yearling fish were PIT tagged, 100 radio tagged, and all marked with a distinct visual implant tag (right side, green) to ensure that returning adults will be counted and allowed to pass Lower Granite Dam.

Pittsburg Landing P&table Acclimation/Release Facility

SPONSOR/CONTRACTOR:
R. Ed Larson, Nez Perce Tribe (208/843-7320)

GROW:
Anadromous Fish

ABSTRACT:
The purpose of this project is to assist in the recovery and restoration of fall chinook salmon in the Lower Clearwater River through the installation and operation of a portable fish acclimation facility near Peck, Idaho. The facility acclimates and releases approximately 150,000 yearling fall chinook from Lyons Ferry Hatchery from early March to mid-April.. Additional acclimation/release of 50,000 yearling fall chinook and 280,000 subyearling fall chinook have or will occur in 1997. Operations began with the acclimation and release on April 14 to April 17 of 150,000 yearling fall chinook. The yearling salmon (12 fish per pound) are reared in sixteen 20' x 4.5' circular aluminum tanks located on a gravel parking lot near the river bank. Clearwater River water is pumped at a rate of up to 3.6 cubic feet per second (cfs), or 1600 gallons per minute (gpm), into the tanks and discharged back into the river. A thorough description of construction and installation of the facility is provided in an environmental assessment by Weller (COE 1996) and "Consultation No. 649, Operation of Big Canyon fall chinook acclimation facility 1997- 1999" (NMFS, 1996). The fish are reared and acclimated in the facility for four to six weeks to a size of approximately 10 fish per pound before release into the Clearwater River. Fish release procedures are designed to minimize stress and physical harm to the fish by releasing directly from the tanks into the river through eight inch hoses. The Big Canyon site was selected due to its accessibility, NPT ownership, and because of the proximity of spawning habitat, see "Mainstem Clearwater River Study, Arnsberg (NPT 1992)". Monitoring and evaluation of juvenile outmigration and adult returns is accomplished by the NPT and WDFW. In 1997, of the first 150,000. yearlings, ten thousand were PIT tagged, 100 radio tagged, and all marked with a distinct visual implant tag (left side, green) to ensure that returning adults will be counted and allowed to pass Lower Granite Dam.

5 5 2 1 5 0 0

Rogersburg (Above Mouth of Grande Ronde River) Portable Acclimation/Release Facility

SPONSOR/CONTRACTOR:
R. Ed Larson, Nez Perce Tribe (208/843-7320)

GROUP:
Anadromous Fish

ABSTRACT: *
Install, operate, maintain and disassemble a portable acclimation facility to assist in recovery and restoration of fall chinook salmon in the Snake River. This facility will be used to acclimate approximately 150,000 yearling fall chinook salmon from Lyons Ferry Hatchery-from early March to late April, beginning in 1997. The fish will be reared and acclimated in the temporary facility for four to six weeks to a size if approximately 10 fish per pound before release into the Snake River. Releases will occur during rising stream flow conditions and at night to minimize predation by birds or other fish. Fish will be released at the same time or slightly preceding fall chinook salmon releases at Lyons Ferry Hatchery.

Development and Refinement of Natural Production Objectives and Enhancement Strategies for Yakima Basin Anadromous Salmonids

SPONSOR/CONTRACTOR:
Mel Sampson, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
The initial purpose of this project is to develop refined production goals for summer steelhead and fall chinook based on a detailed diagnoses of the factors limiting natural production of these species in the‘ Yakima Basin. Specific enhancement strategies are developed for each distinct diagnoses, and the refined production goals are the logical outcome of diagnoses andgtrategies. The ultimate purpose of the project is to develop an optimal enhancement strategy for all anadromous salmonids in the subbasin `-- extant and extirpated. The key to this optimal, multi-species enhancement strategy is to describe critical diagnostic elements applicable to all species.

Thus far, most of the effort has been devoted to analyzing productivity from an ecosystem perspective. Emphasis was placed on productivity instead of capacity because productivity determines sustainability, and the most important goal for depressed populations must be to increase sustainability. The Subbasin was viewed as a landscape of resources that changes in space and time, providing good survival conditions for successive lifestages of fish only along certain “trajectories. These trajectories across the space/time landscape correspond to “life histories”. Emphasis was placed on methods to increase the productivity (low density smolts/ spawner) of existing, viable (sustainable) life histories,. as well as increasing the overall number of viable life histories. Many identified enhancement strategies consist of long term habitat enhancement projects. Enhancement by supplementation is proposed as an interim measure for certain life histories to be employed until productivity of the natural habitat can be restored to criteria levels.

The general objectives of the project were described above. Specific objectives are as follows:

1. Identify existing objectives for steelhead and fall chinook as well as objective for other species and resources that affect the management of steelhead and fall chinook.
2. Describe current and historical production areas and productivities for steelhead and fall chinook.
3. Develop a computer model to analyze current and historical production patterns.
4. Use Patient/Template analysis to develop diagnoses for current populations of steelhead and fall chinook and develop treatment strategies based on these diagnoses.
5. Analyze potential benefits and risks of proposed treatments both to target and-non-target populations.
6. Identify critical assumptions in proposed enhancement strategies.
7. Describe refined production objectives based on diagnoses and strategies.

5522300

Box Canyon Watershed Project

SPONSOR/CONTRACTOR:

Bill Towey, Kalispel Tribe of Indians (509/445-l 147)

GROUP:

Resident Fish

ABSTRACT:

Proposed by the Kalispel Tribe in 1995, this project is to provide an upland management prospective to better manage priority watersheds within the Box Canyon reach of the Pend Oreille River. Ranked in the FY 1997 CBFWA Resident Fish Managers process, this project addresses the NWPPC resident fish section 10.8B.15. It is complimentary to the Kalispel Resident Fish project (95-00100) as it will assess specific upland conditions and propose measures to offset upland related impacts to the riparian and instream habitat enhancements. The project will focus on the Cee Cee Ah Creek watershed for FY 1997 and will continue in out-years on other priority tributary watersheds. The upland management activities associated with this project are'consistent with and complimentary to the goals and objectives 'in the Kalispel Natural Resource Department's Fish and Wildlife Management Plan.

Enhanced Tribal Tributary Fish and Wildlife Law Enforcement--Part 1. Nez Perce Tribes

SPONSOR/CONTRACTOR:
Si Whitman, Nez Perce Tribe (208/843-7320)

GROUP:
Anadromous Fish

A B S T R A C T :
The Nez Perce Tribal Fisheries Enforcement Program has been in existence since November 28, 1995. The program is designed currently for 5 commissioned officers and 1 clerk dispatcher. Though a small department, its mission is a large one. Primary responsibility of this program is the protection of the fisheries resource within the original Treaty.of 1855 boundaries, as legally defined in Indian Claims Commission surveys. Emphasis protection is on Endangered Species Act listed or endangered migratory fish species in the above mentioned areas (Columbia River Sub-basin Tributary Enforcement). Coordination and cooperation with other Columbia Basin fisheries law enforcement and local law enforcement entities is stressed. Secondarily, as a component of protecting the fisheries resource, this program also patrols and investigates for possible habitat degredation, which of course would effect fisheries and the whole eco-system in general.

Wildlife Plan: Standardize M&E

SPONSOR/CONTRACTOR:
Peter Paquet, NPPC (503/222-5 161)

G R O U P :
Wildlife

ABSTRACT:
The purpose of this project is to develop a plan to monitor progress on wildlife mitigation in a consistent way across the region by providing standardized monitoring and evaluation techniques for wildlife mitigation efforts. This project will provide the data and analysis necessary to make regional decisions regarding the soundness of the biological objectives of the wildlife mitigation program. This project will lead to standardized techniques that will be used by all project implementors. This will serve as the foundation for the adaptive management approach. It will also contribute to standardizing of the monitoring and evaluating of terrestrial components of watershed projects. It will likely be developed through the use of contractors.

Selective Predation/Development of Prey Protection

SPONSOR/CONTRACTOR:
Matthew Mesa/Tom Poe, National Biological Service (569/538-2299)

GROUP:
Anadromous Fish

ABSTRACT:
This project was initiated in 1982 as a cooperative effort between ODFW and USFWS/USGS to determine the loss of outmigrating juvenile salmonids in John Day Reservoir. Results of that study indicated a loss of about 3 million juvenile salmonids to predation annually in that one reservoir. Phase 1 of this study included documentation of dietary and consumption rates of the 4 major predators of that reservoir (northern squawfish, smallmouth bass, walleye, and channel catfish). Phase 2 of this project, which is ongoing, is research into the relative vulnerability of juvenile salmonids of varying conditions to predation. Phase 3, also ongoing, is designed to develop measures for protecting juvenile salmonids from northern squawfish, including alterations in hatchery release strategies and development of biological criteria for design and operation of juvenile fish surface bypass systems and bypass exit design and location. So far, over 35 peer-reviewed papers and technical reports have been produced, documenting milestones of this project. In 1998 and beyond we will: (1) assess the vulnerability to predation of predator-naive and experienced prey and compare rates of return of adult salmon from groups of naive vs. predator-conditioned juveniles at a hatchery; (2) assess the metabolic costs of various exogenous stressors (e.g., physical stresses, BKD, exposure to gas supersaturation) to juvenile salmonids; (3) assess the effects turbidity and refugia on vulnerability to predation of juvenile salmonids; and (4) evaluate the response of radio-tagged northern squawfish to surface bypass collector prototypes, project operations, and distribution of juvenile salmonids in Bonneville Dam forebay.

8201300

Coded-Wire Tag Recovery

SPONSOR/CONTRACTOR:
Pam Kahut, PSMFC (503/650-5400)

GROUP:
Anadromous Fish

ABSTRACT:
Project Overview

The Coded-Wire Tag (CWT) Recovery Project is an on-going recovery program that is used for stock identification of hatchery and wild anadromous salmonid stocks throughout the Columbia Basin. The tag recovery data is used to monitor the status of the various stocks, including those that are threatened and endangered. In addition, the recovery data are used to assess a wide variety of different studies.

WDFW and ODFW carry out a coordinated effort to collect CWTs from mature salmon and steelhead which return to fishery (sport and commercial) and escapement areas (natural spawning grounds, hatcheries, and Bonneville Dam fishways). Sampled heads of tagged fish are transported to ODFW's 'Head Recovery Lab' at Clackamas where the CWTs are recovered and decoded. The CWT recovery and catch/sample information is forwarded to PSMFC's Regional Mark Processing Center where it is validated and made available to users via the on-line 'Regional Mark Information System'.

Coastwide Coded-Wire Tag Program

CWTs were first introduced in the late 1960's as an alternative to fin clipping and various types of external tags. Coastwide use quickly followed and led to the early establishment of large scale ocean sampling /recovery programs by the five State/Province fisheries agencies (ADFG, CDFO, WDFW, ODFW, CDFG). Tagging programs have continued to expand, with over 55 federal, state, tribal, and private agencies (including Canada) now releasing over 50 million CWT marked salmonids yearly. Approximately 1,600 new tag codes are released annually, representing hundreds of studies at a cost of over five million dollars. The marking cost per tag is approximately 10 cents. An additional $9-10 million is expended coastwide annually in the recovery effort.

Program components pertinent to the Columbia basin include:
1. Oregon ocean fisheries sampling (ODFW);
2. Columbia basin CWT sampling programs (ODFW and WDFW);
3. CWT extraction and decoding operation (ODFW/Clackamas lab); and
4. Regional Mark Processing Center's Data Management (PSMFC).

BPA's Funding Support of Regional Tag Recovery Programs

The extensive coastwide CWT recovery effort is primarily funded by Oregon, Washington, California, Alaska and British Columbia. However, beginning in 1982, BPA has funded its "fair share" of the CWT recovery costs and distribution of CWT data because of the major component of BPA funded tagging in the Columbia River Basin. Approxiniately 30-35% of the total releases coastwide and 17-20% of the total tags recovered coastwide come from BPA funded programs.

In 1992, BPA expanded its fair share funding to include support for 20% of the operations costs of the Regional Mark Processing Center in accomplishing its role as a centralized coordination and data management center for all CWT data.

Benefits of the BPA Funded CWT Recovery Program

The primary purpose of this work is to recover CWTs from fish which are involved in studies such as stock selection, disease and diet evaluations, rearing density studies, evaluation of juvenile studies past hydroelectric dams, overall contribution studies and current life history parameters. However a critical secondary benefit of this sampling program is to provide in-season and post-season fishery and escapement abundance and stock specific information on Columbia River salmonid stocks to state, tribal and federal fishery managers, especially relating to ESA listed chinook stocks.

Without the CWT sampling program, insufficient information would likely result in the elimination of many fishing opportunities, due to the inability to manage the harvest of ESA listed stocks. Monitoring capability of harvest sharing between US and Canadian fisheries required by the Pacific Salmon Treaty would also be diminished without this sampling program.

Role of the Regional Mark Processing Center (RMPC)

Once the CWTs are decoded and processed by ODFW's Tag Recovery Lab, the recovery and associated catch/sample data are reported to PSMFC's RMPC. After passing a variety of validation checks, the recoveries are combined with the coastwide recoveries reported by other agencies. Data users may then query the on-line 'Regional Mark Information System' (RMIS) to obtain tag recovery for research and harvest management analysis. The Mark Center also serves as the site for exchanging U.S. CWT data with Canada for Pacific Salmon Treaty purposes.

8331900

New Fish Tag System

SPONSOR/CONTRACTOR:
Earl Prentice, NMFS (2061553-42 19)

GROUP:
Anadromous Fish

ABSTRACT:
In 1983, the National Marine Fisheries Service (NMFS), with support from the Bonneville Power Administration, initiated a project to adapt developing electronic technology to provide needed information on fishery resources in the Columbia River Basin. The new technology that has since been developed and applied is referred to as the miniature passive integrated transponder or PIT- tag system. The system is currently used throughout the Columbia River Basin by resource stakeholders. The basic system involves a relatively small (12-mm in length by 2.1-mm in diameter) tag with antenna and microchip encapsulated in glass. Each tag is uniquely coded with 1 of 34 billion codes and is activated and transmits the identifying code via a 400-kHz tag detector (interrogation) system. Over the years, a variety of interrogation systems including hand-held detectors, rectangular and circular flumes in fish bypass systems located at dams, and portable, self-contained units for field research have been developed and have provided the technological basis for many of the research and monitoring programs in place in the Columbia River Basin and elsewhere.

Several projects are underway to extend the usefulness of the PIT-tag system. These include separation-by-code systems that permit isolation of specific fish based on their predetermined PIT-tag code, towed arrays with detectors in the cod-end of trawl nets for the detection of free-swimming fish in estuaries, dam forebays, and other open water areas, and a new generation of pass-by rather than pass-through detectors. NMFS researchers will also continue to assist with the development of the 134.2 KHz PIT-tag and supporting equipment.

Smolt Condition & Arrival Timing at Lwr Granite

SPONSOR/CONTRACTOR:
Ed Buettner, IDFG (208/799-5010)

GROUP:
Anadromous Fish

ABSTRACT:
The IDFG Smolt Monitoring Project (SMP) is part of the Basin wide Smolt Monitoring Program which is mandated in the Northwest Power Planning Council's Program for flow augmentation and spill management as it affects wild and-hatchery salmonid stocks in terms of survival and rate of migration. We operate two migrant fish traps, one on the Snake River at Lewiston and one on the Salmon River at the Twin Bridges between Riggins and White Bird. In addition to collecting smolt migration data we also PIT tag representative groups of chinook and steelhead which are subsequently collected downriver at the dams. The PIT tag data provides information on arrival timing at the head of Lower Granite Reservoir and at the dams. It also provides travel time and survival information between tagging sites and subsequent collection sites. We examine the relation between migration rate and environmental variables such as discharge, temperature, and turbidity and the biological variable of smoltification. This provides managers in-season information on which to base flow augmentation and spill decisions relative to management of endangered chinook and sockeye salmon juveniles and steelhead trout. This information is also required for BiOp measure implementation and development of information required for decision path determinations. In addition, smolt-to-adult survival rates calculated from the PIT tag data will contribute to the decision path regarding long team mitigation measures.

8335000

Nez Perce Tribal Hatchery

SPONSOR/CONTRACTOR:
Ed Larson, Nez Perce Tribe (208/843-7320)

GROUP:
Anadromous Fish

ABSTRACT:
NPTH is a conservation, supplementation facility designed to recover and restore anadromous fish runs in natural habitats including listed Snake River fall chinook and non-listed spring chinook. The project is described in the 1994-95 Columbia Basin Fish and Wildlife Program under Section 7.4M (.1,.2,.3) and is Bonneville Power Administration (BPA) project number 8335000. Located in north central Idaho in the Clearwater River basin, this project involves more than 300 miles of river and stream. The program is one of the fifteen (15) high priority supplementation projects supported by NMFS and the US v. OREGON Production Advisory Committee. The Master Plan (MP) was presented to the Northwest Power Planning Council and approved 5 June 1992 and they recommend completion of NEPA followed by construction. In addition to the MP, the project has developed seven (7) major documents to support the master plan in keeping with the political and biological changes in the Pacific Northwest during the last five years. A Final Environmental Impact Statement (FEIS) with a Record of Decision (ROD) 'is anticipated in June 1997. Final design and construction will occur through the next five years, 1997-2001. The project is designed to be compatible with the NMFS Final Recovery Plan" anticipated in 1997. The adaptive management profile utilizes IHOT guidelines for production, design, and operations. The program is sensitive to the biological needs of each species with an emphasis on recovering and restoring natural populations through supplementation in accord with the 1855 Tribal Treaty Rights. Rearing techniques pursue a "Natures" approach as described by National Marine Fisheries Service. Production releases are based on estimated carrying capacity and occur where habitats have been improved or enhanced. Minimum adult production goals are 1,506 spring chinook, 1,500 early spawning fall chinook and 3,100 late spawning fall chinook. When smolt to adult survival, currently estimated at 0. l-0.2% though the Snake and Columbia River hydroelectric projects increases to 0.5% to 1 .0%, these predicted adult numbers will increase by a similar magnitude. Project goals are 1) to protect, mitigate, and enhance Columbia River Basin anadromous fish resources, 2) to develop, increase, and reintroduce natural spawning populations of salmon within the Clearwater River subbasin, 3) to provide long-term harvest opportunities for Tribal and non-Tribal anglers within the Nez Perce Treaty lands within four salmon generations (20 years) following project completion, 4) to sustain long-term fitness and genetic integrity of targeted fish populations, 5) to keep ecological and genetic impacts to non-targeted fish populations within acceptable limits, and to promote Nez Perce Tribal management of Nez Perce Tribal Hatchery facilities and production areas within Nez Perce Treaty lands.

Monitoring and Evaluation design provides five (5) control streams and five (5) treatment streams and one (1) experimental stream for spring chinook (Supplement to the Master Plan, 1995). The monitoring plan was developed using RASP guidelines. Additional information is gathered from and shared with Idaho Salmon Supplementation (ISS) studies. Broodstock management will monitor genetic profiles by species and stock over time which integrate natural and hatchery spawners to prevent domestic selection resulting in negative genetic factors.

Production facilities will consist of two Central Incubation and Rearing Facilities (CIRF) which will provide fish to six (6) satellite facilities and three (3) streams to fulfill the small- scale, low-cost concept. Capital construction costs estimates for two CIRF, Cherrylane and Sweetwater Springs are $16.5 million and six satellite at $3.5 million. Annual operations and maintenance and monitoring and evaluation costs are expected to range between $1.2 to $1.5 million depending on marking costs and the intensity of evaluation procedures.

8343500

Umatilla Hatchery Satellite Facilities Operation and Maintenance

SPONSOR/CONTRACTOR:
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

ABSTRACT:
The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) are cooperating in a joint effort to enhance steelhead and reestablish salmon runs in the Umatilla River Basin. As an integral part of this program, Bonifer, Minthom, Imeques C-mem-ini-kern and Thomhollow satellite facilities are operated for acclimation and release of juvenile salmon and steelhead. Minthom is also used for holding and spawning adult summer steelhead and Three Mile Dam is used for holding and spawning adult coho and fall chinook salmon. The South Fork Walla Walla facility, scheduled for completion in 1997, will be used for holding and spawning adult spring chinook salmon.

Since the facilities began operation in 1983, approximately 1.02 million juvenile summer steelhead, 602 thousand coho salmon, 7.4 miliion fall chinook and 3.3 million spring chinook salmon have been acclimated and released. Presently, approximately 3.5 to 4.0 million salmon and steelhead are acclimated annually. This represents approximately 70% of all annual releases into the Umatilla River Basin. A final acclimation/release facility near Pendleton is scheduled for construction in 1998.

All juvenile release groups are representively coded-wire tagged to determine survival and contribution to ocean, Columbia and Umatilla River fisheries and to compare survival differences of acclimated and control (non-acclimated) groups. Results from the acclimation studies are inconclusive.

Summer steelhead have been spawned each year since 1983 and an estimated 3.05 million green eggs have been taken. Beginning in 1991, fall chinook and coho salmon broodstock have been collected and spawned in some years. An estimated 1.93 million green fall chinook eggs and 1.62 million green coho eggs have been taken. The eggs are transferred to ODFW hatcheries for incubation, rearing and later release as smolts back into the Umatilla River Basin.

The Umatilla River Basin fisheries restoration plan; of which the Umatilla Hatchery satellite facilities are a key component, has resulted in annual returns of salmon and steelhead to the Umatilla River of 3,300 to 8,000 adults in the last 12 years.

The satellite facilities will continue to be operated in conjunction with the Umatilla Hatchery and used for acclimation of juvenile salmon and steelhead and for holding and spawning of adults. Additional acclimation and spring chinook incubation and rearing facilities are needed to achieve Umatilla River adult return goals. It is hoped that increasing adult returns to the Umtilla River will eventually meet natural production, harvest and broodstock/egg take goals which would make the program self sufficient.

Umatilla Passage 0&M

SPONSOR/CONTRACTOR:
Ron Morris, US BOR (541/276-1663)

GROUP:
Anadromous Fish

ABSTRACT:
There are five major irrigation diversions on the Umatilla River that historically presented significant passage problems for both upstream migrating adults and downstream migrating smolts. These diversions are Three Mile Dam, Maxwell diversion, Westland diversion, Feed Canal diversion, and Stanfield diversion. Problems with out-of-criteria ladders and canal screens were deemed particularly troublesome as we moved ahead with the reintroduction of salmon into the basin. During tbe period 1986-1993, Bonneville Power Administration (BPA) funded the design and construction of passage improvements at these facilities. The process included participation from Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Oregon Department of Fish and Wildlife (ODFW), National -Marine Fisheries Service (NMFS), United States Bureau of Reclamation (USBR), and the irrigation districts. Improvements involved new vertical slot fish ladders (all except Maxwell), rebuild of existing adult passage (Three Mile and Maxwell), new rotary drum screen and bypass facilities (on the canals associated with all five diversions), and adult and juvenile fish trapping facilities (Three-Mile and Westland).

O&M of these passage facilities was phased in as each facility was completed, beginning with the completion of Three Mile in 1987. O&M activities include those things needed to maintain the passage facilities in operating condition as designed and within criteria for fish passage, as distinguished from actually operating the facilities. Maintenance activities include cleaning trash racks and screens, lubing mechanical equipment, removing deposits of silt and gravel, and adjusting flow levels and water heights. Periodic major maintenance of pumps and screens and capital replacement is also covered. Actual operation for water delivery is handled and paid for by the irrigation districts. Actual operation of the trapping facilities is covered under project 8802200 (Trap and Haul) and 9000500 (Passage Evaluation).

Currently, Passage O&M is obtained through contractual services with the Bureau of Reclamation. The majority of the day-to-day activities are handled through a subcontract between Reclamation and the irrigation districts, the logic being that district personnel are on-site on a daily basis anyway, and that it is desirable to build a sense of commitment and ownership by the districts for fishery matters; This partnering approach seems'to be working, as districf Reclamation, Tribal, and State personnel typically work closely together to keep the facilities working for fish passage and water delivery purposes. Starting with the current fiscal year, the scope of the Passage O&M contract was expanded to provide coverage for the five existing hatchery satellite facilities as well. The focus is on providing routine and emergency gravel/silt removal at water intakes and smolt bypasses, and providing repair/maintenance services for critical equipment such as pumps.

8346500

Libby and Hungry Horse Modeling Technical Analysis

SPONSOR/CONTRACTOR:
Brian Marotz, MDFWP (406/75 l-4546)

GROUP:
Resident Fish

ABSTRACT:
Two FORTRAN simulation models were developed for Hungry Horse and Libby reservoirs located in northwestern Montana. The fortran core was set in a BASIC matrix to facilitate user control of input and output data. The models examine the physical operation of the dams including the water budget and downstream flood concerns, and predict the resulting thermal structure of the reservoir and biological responses. Dam discharge volume and tailwater temperatures are used in downstream analyses of river conditions. Biological responses include: primary production and washout, . zooplankton production and washout, the deposition of terrestrial insects on the reservoir surf", benthic dipteran production, and body growth of major game fish. The models simulate temperature control in the rivers downstream through the use of selective withdrawal structures on both dams. Parameters and coefficients were defined by a long-term source of empirical data (1982- 1996). The Libby model LRMOD simulates a -tiered flow approach designed for the recovery of the endangered Kootenai River white sturgeon. The Hungry Horse model HRMOD examines the growth potential of trout in the Flathead River downstream. The models are set in a physical framework that examines the hydrological condition and flood control at points upstream and downstream of the dams. Subbasin attributes are modeled in the context of the Columbia Riversystem as a whole. The models are cite-specific so can not be directly applied to other headwater storage projects. The modeling technique, however, can be applied to other projects, given the necessary data. This project funds one modelor to update the models as new data become available, add new utilities necessitated by user demands, provide simulations and document results for system analyses.

Libby Reservoir Levels/Kootenai IFIM

SPONSOR/CONTRACTOR:
Brian Marotz, MDFWP (406/75 l-4546)

GROUP:
Resident Fish

ABSTRACT:
Construction of Libby Dam on the Kootenai River (completed in 1972), caused many physical and biological changes in Libby Reservoir, known as Lake Koocanusa, and the Kooienai river tailwater. Reservoir changes include a significant decline in native gamefish species (mountain whitefish, westslope cutthroat trout and the U.S. population of bull trout) and a significant increase in abundance of a nongame native, the Columbia River chub or peamouth, northern squawfish and introduced kokanee salmon. Since impoundment, zoopiankton densities have declined and species composition have changed. Reasons for these changes include; conversion from lotic to lentic environment, migration barriers created by the dam, inundation of spawning and rearing tributaries, varying reservoir levels and reservoir aging (declining productivity). Post-impoundment impacts to the Kootenai River' include the reduction of white sturgeon to endangered status, collapse of the burbot population and the isolation of the bull trout population between Kootenai Falls and the dam. Native interior redband rainbow now exist in only two tributaries of the Kootenai River. River operation has created an extensive, low productivity varial zone, greater substrate imbeddedness and the accumulation of deltas at the mouths of tribuatary streams. The aquatic insect community has become less diverse and less . productive. Research began in 1982 provided insight to the effects of dam contruction and operation on the biota of the Kootenai watershed and resulted in the construction of the biological model LRMOD. This model was used to develop Integrated Rule Curves for Libby Dam. River investigations (IFIM research), nearing completion in 1997, refine the balance in dam operation to limit impacts and potentially enhance the biotic communities of the Kootenai Basin. Field research provided a list of habitat enhancement project to be implemented as this project transitions from research to on-the-ground mitigation. The Libby Mitigation Plan (project 9500400), to be submitted to the Northwest Power Planning Council in 1997, provides direction and public input for site-specific projects to be implemented by this project. Pilot projects were initiated in 1996.

North Fork John Day Habitat Improvement

SPONSOR/CONTRACTOR:
John Sanchez, USFS (54 l/278-38 19)

GROUP:
Anadromous Fish

ABSTRACT:
Stream surveys and monitoring programs on the NPJD Ranger District have documented high water temperatures, degraded stream bank and channel conditions, and overutilization of riparian vegetation associated with livestock grazing. In their evaluation of habitat improvement projects in the Grande Ronde and John Day basins prepared for BPA, Beschta. et al. (199 1) recommended that restoration of riparian vegetation should be the focus of habitat improvement projects. They concluded that riparian exclosure fencing was the most successful means of reducing grazing impacts and improving riparian habitat.

Since 1993 about 76 miles of seasonal electric livestock exclosure fences have been constructed to protect and restore about 60 miles of riparian habitat with funding from BPA. Monitoring results indicate that the fences were 98% effective in excluding livestock. Seasonal electric fencing has several advantages over more permanent types of fencing. It is considerably less expensive to install and maintain. It is much more flexible in terms of the location and during of use. Fenced areas can more easily be expanded or reduced. When the area has adequately recovered, it can be removed, if necessary, and moved to another location. It has minimal visual impact. And, since it is only in place seasonally (except for the posts), it is less restrictive for access for otherriparian uses such as recreation and wildlife, and there is less potential for injury to wildlife.

The major objective of the project is to improve habitat quality for anadromous and resident fish species by restoring riparian vegetation and riparian ecosystem function in areas impacted by livestock grazing. Specifically, this project is designed to:

1. Increase stream surface shade and reduce water temperatures;

2. Promote stream channel narrowing, deepening, and complexity;

3. Increase size, age class composition, distribution, and diversity of riparian plants, particularly shrubs.

Smolt Monitoring at Federal Dams

SPONSOR/CONTRACTOR:
Pam Kahut, PSMFC (503/650-5400)

GROUP:
Anadromous Fish

ABSTRACT:
This project is the implementation of the systemwide Smolt Monitoring Program at John Day and Bonneville dams. The Smolt Monitoring Program objective is to develop and maintain a long term consistent data base to provide a foundation for management decisions on flow and spill passage mitigation measures. National Marine Fisheries Service samples hourly at the project, collecting daily and hourly data on numbers of fish in the sample, by species. In addition they report hourly flow and spill. Information on gas bubble trauma symptoms is collected as well as fish condition and descaling. The information is-transmitted daily to the Fish Passage Center through a remote data entry program. The data are incorporated in the system wide data base and distributed by the FPC.

8402100

Mainstem, Middle Fork, and N. Fork John Day River

SPONSOR/CONTRACTOR:
William Noll, ODFW (541/963-2138)

GROUP:
Anadromous Fish

ABSTRACT:
Presentation describes Oregon Department of Fish and Wildlife's project for anadromous fish habitat rehabilitation measures on 57.9 miles of private land within the North, Middle and Mainstem subbasins of the John Day River.

The John Day River is unique. It's one of the longest undammed rivers in the United States. It has one of the few remaining anadromous fish runs which have not been mixed with hatchery stocks. Riparian vegetation degradation is the most serious habitat problem in the John Day River subbasin with approximately 660 degraded stream miles identified (John Day River Sub-Basin Plan, September 1989). Additionally, the Integrated System Plan for the John Day River Basin (Table 22, pg. 83) identifies "habitat. loss and passage barriers" as the subbasin limiting factors and prescribed "habitat, passage and flow enhancement" as the major activities necessary to mitigate the problems.

Project goals are to rehabilitate and improve anadromous fish spawning and rearing habitat, thereby contributing to the Northwest Power Planning Council's interim goal of doubling anadromous fish runs in the Columbia River basin. Anadromous salmonid production is increased by reducing sediment loading and water temperatures, improving riparian and instream habitat diversity, and improving fish access to preferred habitats. Improvements are accomplished through fencing, planting, rock or juniper riprap placement, boulder placement, pool excavation, and weir and fish ladder construction.

Accomplishments now total 57.9 miles of streams, 92.6 miles of fence, 135 livestock watering gaps, 3 fish passage structures, and 1,463 acres of fenced riparian lands. In 1998 we intend to fence an additional 5 miles of stream and continue the maintain existing projects.

Spring Chinook - Average run size is currently 1,800 fish (Integrated Systsem Plan). Adult potential is estimated to be 7,125 (U.S. vs. Oregon). Since the inception of habitat improvement measures in 1986, redd counts above the town of Prairie City have averaged 10.8 redds per mile, with highs of 19 in 1987 and 17.5 in 1996. Previously, between 1959 and 1987, only two years have exceeded 10 redds per mile (Neal, Jerome, Delane. 1996).

Summer Steelhead - Average run size is currently 19,215 fish Integrated System Plan). Adult potential is estimated at 24,613 1U.S. vs. Oregon). In 1987 redd counts in Fox Creek were 2.0 redds per mile. In 1996 they have jumped to 12.3 redds per mile (Neal, Jerome, Delano. 1996).

Nesting Bird Species - In 1986 twenty species of birds were counted within a one mile section of newly fenced riparian corridor. In 1996 forty species of birds were counted within the same fenced area (Neal, Jerome, Delane. 1996).

Grande Ronde Habitat Enhancement

SPONSOR/CONTRACTOR:
VANCE MCGOWAN, ODFW (541/963-2138)

GROUP:
Anadromous Fish

ABSTRACT:
On July 1, 1984, the Bonneville Power Administration and the Oregon Department of Fish and Wildlife entered into an agreement to initiate fish habitat enhancement work in the Joseph Creek subbasin of the Grande Ronde River Basin in northeast Oregon. On July 1, 1985, the Upper and Middle Grande Ronde River, and Catherine Creek subbasins were included in the contract (Contract No. DE-BI79-84BP 16 114), and on March 1, 1996, the Wallowa River subbasin was added. Five of a total of ten subbasins within the Grande Ronde Basin are included in the project area. The primary goal of the "Grande Ronde Basin Fish Habitat Enhancement Project" is to access, create, improve, protect, and restore reparian and instream habitat for anadromous salmonids, thereby maximizing opportunities for natural fish production within the basin. This project provides for implementation of Program Measure 703 (C)(l), Action Item 4.2 of the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program (NWPPC, 1987) and will be done as offsite mitigation for mainstem fishery losses caused by the Columbia River hydroelectric system. Accomplishing this goal will partially mitigate these losses.

This project establishes long term riparian and instream habitat protection and improvement,.All work conducted by the Oregon Department of Fish and Wildlife is on private lands and therefore requires that considerable time be spent developing rapport with landowners to gain acceptance of and continued cooperation with the program throughout a 10-l 5 year lease period. Activities of this project are coordinated with and complement fish habitat restoration projects on federal lands within the basin. Individual projects contribute to ecosystem and basin-wide watershed restoration and management efforts underway by other groups or agencies. Targeted stocks include Snake River spring and summer chinook and Snake River summer steelhead, but bull trout and many species of wildlife are expected to benefit from this project.

The project has signed lease agreements with other 20 different landowners, and currently has 24.4 miles of stream and 566.6 acreas of riparian habitat protected in the Upper Grande Ronde drainage; 18.5 miles of stream and 371.3 acres of riparian habitat protected in the Joseph Creek subbasin; and 2.8 miles of stream and 16.4 acres of habitat protected in the Camas Creek drainage which is coordinated through the John Basin Fish Habitat Enhancement Project (Project Number 8402100). Specific accomplishments to date include: 1) construction and maintenance of 89.1 miles of riparian fencing, and construction of 20 offsite spring developments to encourage utilizaton of upland forage by cattle and reduce habitat degradation along streams; 2) planting approximately 48,000 riparian trees and shrubs where natural revegetation has not occurred at an acceptable rate; 3) installing approximately 2,100 site-specific instream habitat structures designed to address factors limiting salmonid production; 4) control of noxious weeds on 95 I acres of riparian habitat; and 5) procurement of additional funding for projects from other sources (FEMA, GWEB, etc.).

A long term monitoring program has been inplace that includes permanent thermographs established to

monitor hourly stream temperatures at 10 locations on five streams; taking photopoint pictures at over 100 sites; collecting data from 140 habitat monitoring transects on four streams; and numerous physical or biological surveys that are done by this project or coordinated with respective ODFW fish districts.

The project has been proactive in public outreach, interagency coordination, and education by conducting tours of project areas, displaying photographs or giving slide presentations at events such as county fairs, bird club meetings, and to school groups; participating in varoius groups such as the Grande Ronde Model Watershed, Soil and Water Conservation Districts; technology transfer and exchanging data with other agencies and private 1andowners; and publishing and distrivbuting information to news media or natural resource newsletters.

Colville Tribal Fish Hatchery

SPONSOR/CONTRACTORi
Kirk Truscott, Colville Confederated Tribes (509/634-8845)

GROUP:
Resident Fish

ABSTRACT:
The Colville Tribal Fish Hatchery is a project within the North West Power Planning Council's Fish and Wildlife Program that partially mitigates for anadromous fish losses in the "blocked areas" of the Columbia River Basin. The hatchery project was adopted into the Council's fish and wildlife Program in 1984 as resident fish substitution for anadromous fish losses. The project was completed in 1990 and is operating under a 25 year Operations and Maintenance Agreement between Bonneville Power Administration and The Colville Confederated Tribes. An Annual Operating Plan is developed and agreed upon on an annual basis for project operations and monitoring and evaluation.

The goal of the project is to provide artificial production of fish that will help support and enhance tribal subsistence fisheries and non-tribal recreational sport fisheries within the Colville reservation including it's boundary waters. The fish provided by the facility are intended to be capable of not only direct creel contribution, but to contribute to the natural production component of the reservation fisheries in areas compatible with native fish conservation. The majority of the hatchery production provides a "carry-over fishery rather than a "put-and-take" fishery. Approximately 68% of the fish produced at the facility are distributed as fingerling and sub-catchable size fish, the remaining fish are distributed as legal size fish. Specific'hatchery objectives include: (1) production objectives: 160,000 fingerling rainbow trout (90 fish/lb.), 330,000 sub-catchsble rainbow'trout (30 fish/lb.), 80,000 legal size rainbow trout (5 fish/lb.), 196,000 fingerling brook trout (90 fish/lb.), 330,000 sub-catchable brook trout (30 fish/lb.) and 100,000 lahontan cutthroat trout (30 fish/lb.), (2) fishery Catch Per Unit Effort (CPUE): subsistence fishery of 1 fish/hr and recreational/sport fishery of .8- 1 .O fish/hr, (3) creel fish condition factors: Brook trout (C > 5,500 X l0-7), rainbow trout (C> 5,500 X l0-7), lahontan cutthroat trout (c> 4,500 X l0-7), (4) increase natural production of brook and rainbow trout (10% and 15% respectively) by the year 2010, (5) brood stock objectives: maintain current brood stock sources of brook and lahontan cutthroat, develop a rainbow trout brood stock source (spring spawning) and monitor the adult adfluvial rainbow trout populations in the SanPoil river Basin, Round Lake and Twin , Lakes for assessment of potential brood stock sources for'rainbow trout, (6) Fish culture objectives: provide rearing conditions that prevent the manifestation of bacterial and viral diseases and minimize fin erosion; (7) fishery monitoring objectives: develop and implement thermal unit otolith marking at the hatchery and initiate otolith recovery efforts to access the fishery contribution of hatchery production. The project has met or exceeded the production objectives for all years of operation. The brook trout and lahontan cutthroat trout brood stocks remain in excellent status. Potential rainbow brood stock sources were and continue to be examined, however no determination has been made to their potential contribution to the hatchery program. The facility continues to produce rainbow trout with substantial fin erosion (legal and sub-catchable component). Different feeding regimes are being investigated for potential to reduce fin erosion in future years. The facility experienced it's first disease problem in 1996, with a case of soft shell disease with lahontan cutthroat (100% mortality). The incubation system and pac - columns were disinfected in an effort to reduce the chance of soft shell disease. The Otolith marking process and collection from the fishery have proceeded with brook trout

and rainbow trout (approximately 300 samples), however a suitable method of otolith examination is still in progress. Fishery data is currently being reviewed to begin assessment of CPUE's and creel fish condition factor. Results from the data analysis will bc presented in a supplemental report to BPA during FY-97.

Passage Improvement Evaluation

SPONSOR/CONTRACTOR:
Duane A. Neitzel, U.S. Department of Energy (509/376-0602)

GROUP:
Anadromous Fish

ABSTRACT:
Project 8506200 was established to provide an evaluation of fish screening facilities being constructed and operated in the Yakima River Basin, Washington. The evaluations are guided by provisions of Council Members 7.11 (NPPC 1994) which fotlows from previous Council Measures [Section 800 (NPPC 1987) and Section 900 (NPPC 1984)]. The evaluations are funded by the Bonneville Power Administration (BPA) to ensure screening facilities "correct structural problems at irrigation diversion dams, canals and ditches that interfere with tbe passage of anadromous fish" [Council Measure 7.11 (NPPC 1994)]. In addition to site specific evaluations, this project is used to evaluate proposed operational or design changes that might enhance the protection ofjuvenile salmonids.

Due to the large number of Phase 2 screening facilities, the expense of conducting release-and-recapture tests with fish, and other constraints such as gaining approval to acquire and release fish stocks for research, we are evaluating Phase 2 screens by monitoring if the sites are: 1) properly equipped to provide safe fish passage;
2) operated within their design limits; and 3) properly maintained in a "fish-tight" condition. Additionally, the Phase 2 evaluations included laboratory tests of structural and criteria changes that might improve the operation and effectiveness of the screens. This presentation will include a summary of field tests completed at Phase 2 screens in the Yakima Basin, laboratory tests evaluating a) angled vs. perpendicular approach to 6-foot screens; b) relative effectiveness of a 2-inch, 6-inch, and weir approaches to the fish bypass; and c) the use of infrasound to guide the behavior or juvenile salmonids at screen facilities.

White Sturgeon Productivity Status and Habitat Requirements

SPONSOR/CONTRACTOR:
Kirk Beiningen, ODFW (503/657-2035)

GROUP:
Resident Fish

ABSTRACT:
Once highly migratory and anadromous, white sturgeons are now trapped in Columbia and Snake river reservoirs that do not fulfill all of their life-history needs. Reservoir habitats are-unique, but each fails to provide adequate spawning and/or rearing habitat that will allow white sturgeon to achieve the productivity observed in the population downstream from Bonneville Dam. Potential productivities of impounded populations studied arc two to ten times less than the unimpounded population. To restore productive white sturgeon populations and fisheries in impoundments willrequire: 1) increased spring flows to provide natural spawning habitat and improve recruitment; 2) carefully regulated fisheries to optimize harvest and natural production; and 3) supplementation with transplants or hatchery-produced white sturgeon as an interim measure for populations that still spawn naturally, and as a long-ferm measure in areas with no suitable spawning habitat.

Insp Serv for Little Fall Creek Pass Re:86-090

SPONSOR/CONTRACTOR:
Sharon Conyers, ODFW (503/229-5410)

GROUP:
Anadromous Fish

ABSTRACT:
Provide for the inspection, operation, maintenance, and repair of the Little Fall Creek passage facilities.

The Little Fall Creek Fish Passage Project is located on Little Fall Creek, a tributary of the Middle Fork of the Willamette River. The purpose of the project is to provide anadromous fish passage above two falls, allowing winter steelhead and spring chinook salmon to reach 12.5 miles of spawning and rearing habitat. The upper fishway consists of jump pools cut through a rock falls about 8 feet high. The lower fish ladder consists of a denil-type concrete structure with three legs rising over a 24 foot rock falls.

8709900

Dworshak Dam Impacts Assessment

SPONSOR/CONTRACTOR:
Melo Maiolie, IDFG (208/769- 14 14)

GROUP:
Resident Fish

ABSTRACT:
Dworshak Reservoir is locatred on the north fork of the Clearwater River near Orofino, Idaho. The 716 foot tall dam blocked the entire drainage from use by anadromous species such as chinook, "B" strain steelhead, and lamprey. No fish passage structure was provided around the dam, which is owned and operated by the U.S. Army Corps of Engineers (Corps). The reservoir may be drawn down as much as 155 feet for flood control and power production. Water is also released from the reservoir to benefit anadromous fish.

Many species of sportfish have been stocked into the reservoir. Only kokanee and, to a lesser extent, smallmouth bass and rainbow trout, have survived well in. this fluctuating environment. Research on the reservoir has shown that the kokanee fishery is extremely variable and fluctuates in respone to wide changes in kokanee abundance. The number of adult kokanee has varied from four fish/ha to 100 fish/ha. These swings in kokanee abundance are inversely correlated to the amount of water discharged from the dam. When releases during a year are high, kokanee abundance in the reservoir, and kokanee survival rates, are low. During drier years with less discharge, kokanee survival is better and total abundance increases.

Recently, we have used split-beam hydroacoustics to determine the depths utilized by kokanee near the dam. We then formulated recommendations to the Corps on where to withdraw water to avoid kokanee. During the three years that this was done, the kokanee population reached record high levels. Much of the improvement in kokanee abundance, however, may have been due to a concurrent change in releasing water in July and August for anadromous fish flows.

During 1995 and 1996, we researched changes in kokanee distribution and abundance. During late summer we found that kokanee fry are located in the upper end of the reservoir. Adult kokanee are also in the upper end as they stage for spawning, and intermediate age fish were scattered throughout the reservoir. Drawdowns at this time had little effect on the overall kokanee population. During winter, however, all age classes of kokanee were concentrated near the dam. Releases at this time of year heaviliy impacted the population. An estimated 1 million fish (about 90% of the entire kokanee population) was lost during a three month period of high flows during the winter of 1995-96. This entrainment event virtually eliminated the kokanee fishery for the summer of 1996 and 1997.

This year researchers will be investigating the use of strobe lights to see if kokanee can be scared away from intake structures. Our hope is to find a practical, inexpensive means of minimizing kokanee entrainment.

Umatilla River Basin Anadromous Fish Habitat Enhancement

SPONSOR/CONTRACTOR:
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

ABSTRACT:
The goal of this project is to enhance natural production capabilities of existing summer steelhead and re-introduced spring and fall chinook and coho salmon in the Umatilla River Basin through habitat improvements.

The project implemented cooperative instream and riparian habitat improvements on private lands on the Umatilla Indian Reservation from 1988 to 1992. In 1993, the project shifted emphasis and began to identify watershed-wide causative factors limiting fisheries habitat and natural fisheries production capabilities throughout the Umatilla River Basin. Riparian and instream enhancement projects continued and were expanded to include tributaries outside of Reservation Boundaries.

Impacted subwatershed areas in the Umatilla River Basin have been identified for habitat improvements. Public scoping efforts, baseline monitoring and creation of GIS databases have assisted in targeting habitat deficiencies, detrimental land use practices and development of restoration and management measures. Habitat enhancement projects continue to be implemented and maintained on private properties in the upper Umatilla River Basin to improve natural fisheries production capabilities. A total of 32 riparian casements have been secured for enhancement of 12.7 total river miles of tributary and mainstem habitat in the upper Umatilla River Basin since initial 1988 implementation efforts. Restoration measures have included construction of riparian enclosure fencing, placement of instream large woody debris, placement of sediment recruitment and streambank stabilization structures, revegetation of stream corridors with native vegetation, bioengineering treatments and noxious weed control.

Monitoring continues to be conducted to quantify short and long-term effects of habitat enhancements,. Parameters monitored include various water quality characteristics, aquatic macroinvertebrate diversity and abundance, stream channel morphology, native vegetation recovery, physical stream habitat and fisheries populations.

The project is currently exploring alternative management methods to mitigate for past and ongoing land management activities in the watershed. Alternatives being considered include identification of properties available for purchase, containing significant reaches of high quality anadromous salmonid habitat, and acquisition of long-term or perpetual management rights, such as water rights, timber rights and grazing rights to provide fisheries habitat protection.

This project will continue to provide critical elements to a comprehensive watershed management approach to guide implementing agencies in promoting anadromous fish rebuilding plans, and recommend necessary changes to management systems.

8710002

Umatilla Habitat Improvement / ODFW

SPONSOR/CONTRACTOR:
William Noll, ODFW (541/963-2 138)

GROUP:
Anadromous Fish

ABSTRACT:
The Northwest Power Planning Council's Fish and Wildlife Program (NPPC 1987) calls for the rehabilitation of steelhead and salmon populations in the Umatilla River (Section 703)(c)(l) to partially mitigate for losses attributed to the installation and operation of the Federal Columbia River Power System. The Oregon Department of Fish and Wildlife's (ODFW) Umatilla River Subbasin Fish Habitat Improvement Project was established in 1988 to help meet this directive. Focusing their efforts on private lands, the ODFW project has been working cooperatively with private landowners on tributaries of the Umatilla River Basin actively restoring salmonid habitat. Funded primarily with Bonneville Power Administration (BPA) funds and supplemented with occasional grant monies, ODFW fish habitat projects improve natural fish production through stream habitat improvement and provide the offsite mitigation for salmonids as required by the NPPC plan.
Accomplishments for the ODFW Umatilla River Subbasin Fish Habitat Improvement Project include:
15 year riparian habitat leases on 28 properties
275 acres of leased riparian habitat
253 instream fish habitat structures
15.6 miles of livestock exclusion fence
11 miles of protected stream corridor
2 fish passage improvement projects (project removed two abandoned irrigation dames in-Birch Creek)
Riparian vegetation establishment (program has planted tens-of-thousands of native riparian plants and shrubs and has also experienced tremendous vegetation response from natural. recruitment)
Improved riparian habitat for native animals, birds, amphibians, reptiles, insects, and plants
Reduced streambank erosion
Improved water quality and quantity
The Umatilla project has developed and is implementing a long-term, comprehensive project monitoring and evaluation program. This program consists of:
63 photopoints
9 temperature monitoring sites
30 index sites to assess stream channel morphological changes and vegetative response to habitat protection
annual overflights of project reaches to assess channel response to spring runoff and high water (flood) events
physical/biological surveys of project streams
Umatilla project is proactive in public outreach and education. Outreach and educational activities include:
Public tours of habitat projects
Presentations to schools, community groups, councils, and other natural resource agencies
Newspaper articles, correspondence, annual reports, etc.
Display booths at sportsmen shows, county fairs, etc.
Public workshops to teach habitat restoration techniques

Extensive interaction with private landowners and other agencies/programs working on natural resource issues within the Umatilla River Basin

Other accomplishments include:

First program to introduce and implement bioengineered streambank restoration projects in the Umatilla River Basin

Development and implementation of a multi-agency/volunteer cooperative - model demonstration - bioengineered fish habitat restoration project (14 groups/agencies participated)

Procurement of habitat restoration grants, FEMA funds, and thousands of hours of volunteer labor to assist with the implementation of these projects.

8712700

Smolt Monitoring by Non-Federal Entities

SPONSOR/CONTRACTOR:
Pam Kahut, PSMFC (503/650-5400)

GROUP:
Anadromous Fish

ABSTRACT:
The SMP is mandated in the Northwest Power Planning Council's (NPPC) Program for flow augmentation and spill management and to evaluate any future reservoir drawdowns. The data provides an essential component for making decisions regarding flow augmentation and spill as they affect wild and hatchery salmonid stocks in terms of survival and rate of migration. Gas Bubble trauma data is particularly relevant to strategies for spill management and flow augmentation. At the same time the fish condition data relevant to any water management strategy allows for policy decision makers to reflect on fish passage quality with specific river operations. Decision makers use information on the spring and summer outmigration timing of wild and hatchery chinook salmon and steelhead trout smolts. They also use the data on PIT tagged fish arrival timing at dams, travel time to the dams and relative survival to the dams. This provides managers in-season information on which to base flow augmentation and spill decisions relative to management of endangered chinook salmon juveniles. In addition, smolt-to-adult survival rates will contribute to the decision path regarding long term mitigation measures. Smolt-to-adult survival rate estimates will be obtained from the A Comparative Survival Rate Study of Hatchery PIT Tagged Chinook, which was incorporated in the SMP in 1997. The smolt migration in the Lower Snake and Columbia Rivers is monitored as fish leave the tributaries and pass through the dams, including collection of data required for BiOp measure implementation and development of information required for decision path determinations. Fish are collected in traps or subsampled at dams at an interval relative to the number of fish passing. The 24 hour subsample is anesthetized and species, fork length, GBT, fish injury data are collected. The data are summarized entered into appropriate software and downloaded. Smolts pit tagged and released are used in travel time analyses. Analysis involves summarization and subsequently a regression between travel time and the reciprocal of flow. The salmonids intercepted will be wild and hatchery spring chinook; wild and hatchery steelhead and subyearling fall chinook. The Fish Passage Center plans the annual Smolt Monitoring Program which the fishery agencies and tribes implement at smolt monitoring sites. Fish Passage Center staff provides technical assistance, computer assistance, and biometrician consultation to the SMP sites as needed. Annual reports are prepared by all agencies and tribes participating in the Smolt Monitoring Program.

Travel Time and Survival Smolt Physiology

SPONSOR/CONTRACTOR:
Alec Maule, National Biological Service (509/538-2299)

GROUP:
Anadromous Fish

ABSTRACT:
The objectives of this project are to: 1) Develop a consistent database on the health and physiological status of fish prior to release from hatcheries, 2) Estimate the relative effects of smolt condition and river flows on travel time, 3) Develop indices of smolt condition and health, 4) Determine the effects of severity of BKD infection on the ability of spring chinook to successfully migrate to the ocean, and 5) Provide cooperative technical assistance by monitoring the condition and health of fish used in other studies in the Columbia River Basin. A major goal of the project is to provide data on fish condition that might explain seemingly inexplicable results from other studies. For example, PIT tag survival data from 1996 suggests reduced survival of-late migrating spring chinook in the Lower Monumental-to-McNary section of the Snake and Columbia rivers even though gas supersaturation was similar to that seen at other times of the run. Differences in fish condition might explain these data.

During this study we have determined that the major changes associated with smoltification occur after fish begin to migrate and that fish travel time correlates negatively with level of smolt development. We have developed several non-lethal measures of smolt condition and heaIth including miniaturization of the gill Na+,K+-ATPase assay, skin reflectance, body morphology and mucus lysozyme activity. We have also documented decreases in the incidence of BKD in hatchery spring chinook and attributed this to changes in hatchery practices; During 1997 we will not collect additional data but we will analyze our data to identify factors that are most predictive of survival. As part of our objective to collaborate with other projects in the region, we are currently working with four research groups in the Washington Department of Fish & Wildlife, two research groups in US Fish & Wildlife Service and one research group in the Oregon Department of Fish & Wildlife to design-experiments directed at reducing residualism and precocity of steelhead and salmon. These research groups have ongoing projects with funding from BPA and other agencies; we will work with them to insure adequate experimental design, sampling and analysis of physiological and health variables.

8740700

Dworshak Impacts/M&E & Bio-Int Rule Curves

SPONSOR/CONTRACTOR:
Dave Statler, Nez Perce Tribe (208/476-7417)

GROUP:
Resident Fish

ABSTRACT:
This project is authorized under Measures 10.3C.5 and 10.3C.6 of the Northwest Power Planning Council's September 1995 Fish and Wildlife Program. The purposes of the project are to: (1) conduct research, monitoring and evaluation to determine potential impacts of multipurpose flow operations on resident fish in Dworshak Reservoir, and (2) apply this information to develop biological/integrated rule curves for reservoir operations. We are using the Montana Department of Fish, Wildlife and Parks (MDFWP) modeling approach for resident fish impact assessment and rule curve development. This approach incorporates reservoir ecosystem productivity with other project functions, such as flows for migrating anadromous fish, flood control, power production, and recreation. After coordinating with MDFWP on data needs for model development, four years of biological/physical/chemical data have been collected at Dworshak Reservoir under a variety of environmental conditions. The configuration and operation of Dworshak Reservoir are similar to Hungry Horse Reservoir, one of the reservoirs modeled by MDFWP. Preliminary data analysis suggests that benthic invertebrates at Dworshak and Hungry Horse Reservoirs are similarly impacted by annual reservoir drawdowns. In addition to reservoir productivity, rule curve development for Dworshak Reservoir must consider direct impacts to fish populations, including entrainment, migration and spawning. Managing Dworshak Dam discharges to mimic the natural hydrograph appears to be compatible with rearing threatened chinook salmon in the Clear-water River below Dworshak Dam, as well as maintaining reservoir ecosystem productivity.

Umatilla River Basin Trap and Haul Program

SPONSOR/CONTRACTOR:
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

A B S T R A C T :
The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) are cooperatively working to rehabilitate runs of coho, fall and spring chinook and summer steelhead in the Umatilla River Basin. The Bonneville Power Administration (BPA) and other federal agencies are funding several projects to-accomplish that goal. Included among these projects is the Umatilla River Basin Trap and Haul Program (Fish and Wildlife Program measure 1403 [4.21]) which began implementation in 1989.

The lower 30 miles of the Umatilla River provides an obstacle to migration of both adult and juvenile salmonids during low flow periods. During both juvenile outmigration and adult return periods; parts of the lower riverbetween Threemile and Stanfield dams can be dewatered, stranding migrating salmonids. The U.S. Fish and Wildlife Service (USFWS)(1981) and U.S. Bureau of Reclamation (BOR()1988) have identified flows ranging from 150 cubic feet per second (cfs) to 300 cfs as being necessary for fish passage through the lower 30 miles of river. Flow enhancement and fish passage improvement projects are being built to improve passage conditions. However, even with these projects in place-there are still periods when inadequate passage conditions exist.

The Umatilla River Trap and Haul Program was implemented to assist fish passage. The program goal is to maximize survival of adult and juvenile salmonids through the lower 30 miles of the Umatilla River. The two primary areas of responsibility for the program to meet this goal are: 1) to provide safe transportation for juveniles and adults around this heavily diverted stretch of river and 2) to ensure that fish passage and flow improvement projects are operated in a coordinated manner to facilitate adult and juvenile fish migration.

Since inception of the project, from 3,522 to 9,083 adults (combined total ofcoho, summer steelhead, and spring and fall chinook) have been collected annually at the Threemile Dam trap. Of these annual totals, from 1,061 to 3,906 have needed to be hauled upstream due to inadequate passage conditions. The project has also annually collected and transported from 154 to 1,063 broodstock. There have also been from 914 to 101,000 pounds ofjuveniles trapped and hauled from the Westland collection facility to the mouth of the Umatilla River.

8805301

Northeast Oregon Outplanting Facilities Master Plan - Nez Perce Tribe

SPONSOR/CONTRACTOR:
R. Ed Larson, Nez Perce Tribe (208/843-7320)

GROUP:
Anadromous Fish

ABSTRACT:
In 1987, the Northwest Power Planning Council (NPPC) authorized planning, design and construction of propagation facilities for the Grande Ronde, Imnaha, Walla Walla, Umatilla and Hood River basins with the intent of doubling adult salmon returns to the mouth of the Columbia. The Nez Perce Tribe was contracted to develop master plans for the Grande Ronde and Imnaha River subbasins in coordination with Oregon Department of Fish and Wildlife (ODFW) and Confederated Tribes of the Umatilla Indian Reservation (CTUIR). The Imnaha and Grande Ronde subbasins are located in northeastern Oregon, encompass more than 300 miles of tributaries and empty into the Snake River approximately 500 miles from the Pacific Ocean.

Phase I of this project began in 1987 and was completed in 1990. Draft master plans for the Imnaha and Grande Ronde subbasins were developed under Phase I that described fisheries management history, artificial production goals, conceptual design and operation of new facilities, and potential locations for hatchery and weir sites. The final master plan (Phase II) was scheduled for completion in 1993 but was postponed due to the emergence of critical management issues (i.e., listing of Snake River chinook and sockeye under the Endangered Species Act). .

Phase II was reinitiated in 1996 and the final Master Plan is scheduled to be presented to the NPPC in July 1997. The final master plan finalizes elements identified in Phase I, integrates new production with captive broodstock production and current conventional production, addresses cultural resource issues and considers critical management issues. Facilities planned for the Grande Ronde and Imnaha rivers are low cost, small scale, conservation, supplementation facilities designed to recover and restore anadromous fish runs in natural habitats. Rearing techniques will utilize a “Natures” approach to mimic natural rearing to produce as “wild” a fish as possible, therefore improving survival and decreasing impacts on wild stocks.

Target species under this project are:
Spring chinook (ESA listed)
Summer chinook (ESA listed)
Fall chinook (ESA listed)
Early fall chinook (Extinct)
Coho {Extinct)
Sockeye (Extinct)

Ne Oregon Hatchery - Grand Ronde Satellite Facilities

SPONSOR/CONTRACTOR:
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

ABSTRACT:
Starting in 1982, the upper Grande Ronde River and Catherine Creek in the Grande Ronde Basin were target areas for outplanting spring chinook produced at Lookingglass Hatchery as a part of the LSRCP. However, no satellite juvenile acclimation/release or adult capture/holding facilities were ever constructed under LSRCP at these locations. This project is for design, construction, 0 & M, and M & E of these facilities.

Project planning and need has been documented numerous times since 1989 in efforts such as subbasin planning, the NPPC Fish & Wildlife Program, NEOH planning, COE project add-on's, NMFS priority supplementation projects, and the tribes Anadromous Fish Restoration Plan. Project design and construction is scheduled for completion in 1997 with 0 & M and M & E to begin in 1998.

Recent spring chinook escapements to the upper Grande Ronde River and Catherine Creek are so small they often serve minimal function for seeding the habitat, providing broodstock and fisheries. Artificial. production utilizing endemic broodstock is needed in these areas to bring back the ESA listed spring chinook runs. The satellite facilities will specifically address juvenile acclimation/release and adult broodstock capturing needs which are essential to achieving the overall Grande Ronde Basin adult return goals. Facilities will be sited near natural production areas and will be utilized with captive broodstock and conventional supplementation programs.

The satellite operation will not require new production facilities. Lookingglass Hatchery operated by ODFW will provide approximately 200,000 smolts to be acclimated at each of the upper Grande ronde and Catherine Creek sites. CTUIR will conduct satellite facility operation and evaluation beginning in 1998.

8805303

Hood River Production Program - CTWS - M&E

SPNSOR/CONTRACTOR
Mick Jennings, Warm Springs Tribe (503/296-6866)

GROUP:
Anadromous Fish

ABSTRACT:
The Hood River Production Program (HRPP) is a fish supplementation project in the lower Columbia Basin funded by Bonneville Power Administration (BPA) and jointly implemented by the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) and the Oregon Department of Fish and Wildlife **(ODFW).** The primary goals of the HRPP are to **(1)** re-establish naturally sustaining spring chinook salmon using Deschutes stock in the Hood River subbasin, (2). rebuild naturally sustaining runs of summer and winter steelhead in the Hood River, (3) maintain the genetic characteristics of the population, and (4) contribute to tribal and non-tribal fisheries, ocean fisheries, and the Northwest Power Planning Council's (NPPC) goal of doubling salmon runs in the Columbia Basin.

In accepting the Hood River Production Master Plan, the NPPC recommended adopting athree-phased approach which included collecting three years of baseline information, project implementation and facilities construction and follow-up monitoring and evaluation studies. Comprehensivecollection of data began in the Hood River subbasin in late, 1991, including information on the life history and production of anadromous salmonid stocks returning to the Hood River subbasin. Information collected by the HRPP was used to prepare an environmental impact statement (EIS) evaluating the program's impact on the human environment.

In 1995, following three years of collecting baseline information, the HRPP moved into project implementation and facilities construction. Among other things, this phase of the project included utilizing Hood River native winter steelhead for hatchery broodstock and converting the spring chinook hatchery program from Carson to Deschutes stock and rearing them in Pelton Ladder. The spring chinook rearing program in Pelton Ladder was initiated after earlier studies by PGE biologists were able to show growth and survival advantages with ladder reared spring chinook. Winter steelhead broodstock development actually started in 1992 because of concerns for the availability of wild winter steelhead in the Hood River based on low returns back to the Powerdale Dam adult trap. Techniques such as matrix spawning, acclimation and volitional release of hatchery fish were to be used to improve survival and homing ability and to reduce residualism with wild juvenile salmonids. Also, HRPP is developing a habitat restoration plan to guide habitat projects in the Hood River subbasin.

A major component of HRPP is construction of facilities to handle broodstock development and changes in production. To date, renovations have been made to Pelton Ladder for rearing juvenile chinook, and an adult trap has been built to collect brood and gather M&E data at Powerdale Dam. Projected for construction within the next two years will be an adult holding, spawning and acclimation facility in the Hood River subbasin and expansion of isolation/incubation and rearing capability at Oak Springs Hatchery.

Hood River Production Program - ODFW - M&E

SPONSOR/CONTRACTOR:
Sharon Conyers, ODFW (503/872-5252)

GROW:
Anadromous Fish

ABSTRACT:
The monitoring and evaluation (M&E) component of the Hood River Production Program (HRPP) was implemented beginning in late 1991. The M&E program is funded by Bonneville Power Administration (BPA) and is jointly implemented by the Oregon Department of Fish and Wildlife (ODFW) and Confederated Tribes of Warm Springs Reservation of Oregon (CTWS). The M&E program is designed to collect life history and production information on stocks of anadromous and resident fish in the Hood River subbasin. Information will be used to (1) evaluate various management options and (2) determine any impact the HRPP has on the indigenous populations of fishes in the Hood River subbasin.

The M&E program has collected three years of baseline information on the migration timing, escapement, survival, age composition, size, sex ratio, and spatial distribution of adult salmonids escaping to the Hood River Subbasin. In addition, life history information has been collected on juvenile and resident salmonids which includes (1) estimating numbers of downstream migrants, (2) determining age structures and condition factors of migrants, and (3) determining rearing densities in selected reaches of streams. A statistical creel has also been conducted to collect sport catch information for all species of adult and jack salmonids.

For this presentation we will present information from adult trapping at the Powerdale Dam fish facility, estimates of hatchery and wild smolt production at rivermile 4.5, estimates of angler catch in the lower Hood River, and an overview of fish distribution data collected to date, For more comprehensive information collected by the M&E component of the HRPP see Olsen et al. (1994, 1995, 1996).

8806400

Kootenai River White Sturgeon Study and Experimental Aquaculture

SPONSOR/CONTRACTOR:
Paul Anders, Kootenai Tribe (208/267-35 19)

GROUP:
Resident Fish

A B S T R A C T :
The white sturgeon (Acipenser transmontanus) population in the Kootenai River was listed as endangered by the U.S. Fish and Wildlife Service on September 6, 1994, due to a decline in population size, lack of recruitment during the last two decades, and post-development habitat loss and degradation. History of development in the Kootenai River system during the past 50 years includes channelization and diking, impoundment (construction and operation of Libby Dam), artificial nutrification followed by pollution abatement, mining and industrial activities, and residential and recreational development. The interaction of these development activities appears to be responsible for the collapse of the Kootenai River ecosystem. The Kootenai River White Sturgeon Study and Conservation Aquaculture project was initiated in order to preserve the existing genetic variability of the white sturgeon population, begin rebuilding a healthy age class structure, and prevent extinction while measures are implemented to restore habitat conditions necessary for successful natural recruitment. A breeding plan developed by Dr. Harold Kincaid, and described in the Draft Recovery Plan, will be implemented to guide management in the systematic collection and spawning of wild adults before they are lost from the breeding population. The objectives of the breeding plan include measures to minimize potential detrimental effects of conventional stocking programs and reduce the risk of detrimental genetic effects commonly associated with intensive hatchery production. The Kootenai River Ecosystem Improvements Study was designed to take a holistic approach to ecosystem recovery by compiling a comprehensive baseline biological status report and coordinating the development of a feasibility model to identify remedial actions for future improvement of the Kootenai River drainage. Interagency coordination will ensure the assessment and integration of all available biological, chemical, and environmental information to be used in a basin wide adaptive approach to management of the system.

Kootenai River Fisheries Investigations

SPONSOR/CONTRACTOR:
Vaughn L. Paragamian, IDFG (208/769-1414)

G R O U P :
Resident Fish

ABSTRACT:
Burbot Lota Iota once provided an important winter fishery in the Kootenai River, Idaho. Anglers reported catching over 40 burbot a night during spawning migrations from Canada. However, after construction of Libby Dam, Montana, began in 1972, the fishery collapsed and closed in 1990. Concomitant was the. collapse of burbot in Kootenay Lake, B.C. Libby Dam changed the hydrograph, temperature regime, and nutrient supply. The Kootenai River Fisheries Investigation was initiated in 1993 to address burbot (and rainbow trout) abundance, distribution, size structure, reproductive success, and movement, and to identify factors limiting burbot in the Kootenai River. Few burbot were found. There is little evidence of reproduction in Idaho, yet numerous age groups were apparent in the net catch, indicating spawning somewhere. Sampling for burbot during winter was carried out to intercept a spawning run from Kootenay Lake. Winter sampling during 1993-1996 produced no burbot. Sonic telemetry of burbot during the winters of 1994- 1995 and 1995- 1996 indicated high velocities (>24 cm/s) produced during power production may be inhibiting spawning migration to Idaho. Ripe burbot were captured in B.C., but few burbot were caught upstream, and no burbot have been captured or tracked to Idaho waters before the end of the spawning season. The discharge/burbot migration hypothesis needs a controlled test. Although requested, the U.S. Army Corps of Engineers has not provided suitable conditions. Mitochondrial DNA analysis indicated burbot in the Kootenai River from B.C./Idaho are genetically distinct from burbot in the Kootenai River, Montana. Also, telemetry of burbot has shown the two stocks have different life histories.

The rainbow trout fishery is the most important remaining fishery in the Idaho portion of the Kootenai River. 'In spite of its importance, the fishery is poor in comparison to the Montana reach of the Kootenai and many other rivers in Idaho. Creel studies reported very low catch rates (0.02-0.06 trout/hour). Montana densities are around 500-700 trout/mile, whereas in some of the better trout reaches in Idaho estimated densities are around SO trout/mile. There is an apparent lack of accessible spawning and rearing tributaries. In addition to the potential problem of juvenile production, the conditions in the main river may be resulting-in high rainbow-trout mortality. The objective is to determine if recruitment is limiting the population of rainbow trout Oncorhynchus mykiss in the mainstem Kootenai River. Our research is designed to-develop estimates of juveniles entering the river, in-river survival, and the number of juveniles required to fully seed the Kootenai River. Also of importance is an understanding of the river habitat utilized by adult rainbow trout (i.e., which fishery are juvenile rainbow trout contributing to?). 'Our methodologies include telemetry, outmigrant trapping to estimate juvenile rainbow trout production in tributaries, and assessment of the distribution and habitat use in the Kootenai River.

Streamnet (formerly CIS and NED)

SPONSOR/CONTRACTOR:
Stan Allen, PSMFC (503/650-5400)

GROUP:
Anadromous Fish

ABSTRACT:
Mission. StreamNet's mission is two-fold: 1) to create, maintain, and enhance high quality, regionally consistent biological data that is directly applicable to regional policy, planning, management, and research, and 2) to provide data and data services in an efficient, timely manner and in formats that meet the needs of users.
Project Administration. StreamNet is a cooperative venture of the region's fish and wildlife agencies and tribes. PSMFC manages the project, which is implemented through a partnership involving the states, CRITFC and member tribes, the Shoshone-Bannock Tribes, USFWS, and BPA. Cooperators include NMFS, USGS, EPA, and USFS.

Applications. StreamNet data development and delivery activities are designed to meet specific F&W Program needs. StreamNet data is of use for policy, monitoring and evaluation, project tracking, long-term project planning and selection, public education, watershed planning, and mitigation project implementation.
Services.

Data Development. StreamNet prepares an annual data plan to guide data development. StreamNet maintains detailed natural and hatchery production data for salmon and steelhead including long term time series data for adult escapement, sport and marine harvest, and hatchery returns and releases. Other data includes species distribution, hatchery facilities, dams, and habitat. New initiatives include data on age, juvenile abundance, hatchery practices, and populations, and a project tracking database that will include information on F&W Program mitigation and watershed projects, as well as watershed projects initiated by others.

Data Storage and Delivery. StreamNet utilizes state-of-the-art database and GIS technology. Data can be provided in a variety of formats through the Internet, a Distributed System, FTP, and custom products. A major computer upgrade is underway. With this, sophisticated Internet delivery capabilities will be available to a wide range of F&W Program activities.

Library Services. The StreamNet Library includes materials relating to Columbia Basin anadromous fish. Emphasis is placed on "grey" literature. Services include reference, referral, database searching, inter-library lending, and document delivery.

Technical Assistance. StreamNet provides significant technical database, GIS, and data transfer support services to tribes and state fish and wildlife agencies.

Assistance to Watershed and Restoration Projects. StreamNet assists F&W Program projects by 1) providing baseline biological information, 2) providing data exchange standards and **data** compilation services, 3) tracking projects, 4) preparing custom data and map products, and 5) storing data and

reports prepared through these projects.

Custom Products and Data Requests. StreamNet prepares a range of custom GIS maps, graphs, and data reports. We also produce an annual report depicting the status of salmon and steelhead in the Columbia Basin. Last year we responded to over 1,700 requests for data and data services.

8811500

Yakima Hatchery - Construction

SPONSOR/CONTRACTOR:
Contractor to be selected by BPA, BPA (503/230-3 171)

GROW:
Anadromous Fish

ABSTRACT:
This project holds capital expenses for final design and construction of the upper Yakima River spring chinook hatchery at Cle Elum, Washington, and three satellite acclimation facilities in the upper Yakima River Basin. It contains only the funding necessary to complete the central production facility at Cle Elum for various carryover activities such as wells (CE5 and CE6a - pipes and pumps), M&E facility, chiller and the final design and construction of the three acclimation sites. Note, the O&M for these facilities is reflected under BPA project number 9701300.

(Additional abstract for O&M portion, project 9701300)
There were several challenges constructing the Cle Elum Fish Hatchery. They include:
Short construction window for project this size
Permitting Process
Water Well Field change
Railroad Activation
Coffer Dam
Unusually Severe Weather
Osprey Nest

Short Construction Window

The Cle Elum Fish Hatchery is a large facility spread out over a large area. The total construction site extends l-3/4 mile east to west by 113 mile north to south

Near the west end is a River Pump Station. Near the east end is the new Outfall from the Oxbow Lakes to the Yakima River and new road improvements at the intersection of the Charter road with South Cle Elum Way. In between these ends is the hatchery facility, six ground water wells, a remote emergency generation building, and significant road construction and improvements.

The Cle Elum Hatchery is a complex facility incorporating the latest hatchery control systems available for holding, hatching, and rearing fish; housing for the operation staff; and facilities for the public visitors. It consists of a Hatchery Building, a Maintenance Building, an Office Building, an Electrical Building (housing a 1 megawatt generator), 20 juvenile raceways, two adult raceways, two head boxes, a kiosk, and three residential houses on approximately a 15 acre site.

A short distance up the entrance road from the hatchery is a Visitor Center that will initially provide parking and restroom facilities for the public. Further up the road there is an area being developed to accommodate a Monitoring and Research center.

The one year construction window for a project this size (the initial proposals were on the order of

$14.4M, $l5.7M, and $18.98M.) is aggressive. The goal is to have the facility ready to receive adults beginning in April 1997. Obtaining required permitting and procuring the construction took us into May 1996. The contract was awarded May 20,1996, thus leaving only ten months to complete the work needed for receiving the adult fish and leaving only two months at the end to complete-the miscellaneous work such as landscaping and final road work.

Permitting Process

Having the required permits prior to beginning related portions of the work has been challenging all through the project. Operating within the parameters set by some of these permits has sometimes been challenging. Most of the permits were obtained after the initial contract award. Some of these imposed constraints on the contractor were unknown at the time of award. The contractor has absorbed most of the additional costs due to these permit constraints.

Water Well Field Changes

The project originally included work associated with seven ground water wells spread across the project from east to west. At the time we were entering into negotiations with one of the contractors that provided us a proposal, it was determined that due to lack of water in the wells being drilled, we should delete wells numbered 3,4,5, and 6. In doing this it was decided to relocate the remote emergency generator building that had been located next to well number 5, to a location near well number 1. This resulted in significant electrical changes being required. These changes were for the most part incorporated in the original construction contract. Some of the impacts of the change were not fully realized until later and had to be incorporated into the contract by modification.

As the construction has been proceeding, additional ground water exploration has determined new sites for wells 3,4,5, & 6. Adding these wells back into the contract at their new locations is being done by contract modifications.

Railroad Activation

At the time of starting the procurement of the construction contract, it was believed the railroad would be inactive during the construction period and we would have full access to the roads alongside the railroad tracks. At the time of negotiations with the apparent best buy contractor, the railroad notified us they would be activating the tracks in this area. This resulted in not having free access to the roads alongside the tracks. When we did use the roads, we had to follow restrictive parameters imposed by the railroad. Also the installation of the facilities under the tracks had to be done under the railroad's time schedules and new design requirements. Initially the railroad indicated we would have to have our facilities that go in under their tracks completed by mid July. They also required us to use CDF (essentially light weight concrete) to backfill around the 17' underpass culvert in place of the natural earth fill we had designed. More fill was also required on top. Lowering the culvert to allow more fill on top resulted in a need to also lengthen the culvert in order to clear the tracks. We confirmed with the contractor that they could accomplish that. When we indicated to the railroad we could live with that, they then said it would have to be done by mid-June. We confirmed with the contractor they could do that. We awarded the contract on these bases. When we indicated to the railroad we could live with that, they then said it had to be done with in a 3-day period from June 10th through June 13th. We then had discussions with the railroad that resulted in our being given 5 days, from June 10th through June 14th. During that five-day window the contractor opened up the tracks in two locations, installed both

the 17' underpass and the 4.5' Outfall culvert, and back-filled with CDF. The work was accomplished under these extreme parameters imposed by the railroad by extraordinary efforts by the contractor, the designers, and BPA.

Cofferdam

Permit constraints required that work at the River Pump Station to be complete by November 15th. Therefore, contractor attempted to start this work prior to the river level going down. The cofferdam they installed did not hold. The steel sheet pilings bent under the pressure of the high water level. The contractor had to then wait until the water level dropped. They then went back in , straightened the pilings and continued.

Unusually Severe Weather

This year, the weather in Cle Elum has been unusually severe. It should be expected to have severe winter weather in Cle Elum, but the weather this year has been more severe than what should have been expected. Thus the term unusually severe. Unusually severe weather entitles a contractor to additional time to complete the work affected.

Information submitted by the contractor in support of their request for time extension includes the following data:

Average Snowfall: Nov, 9.4"; Dec, 21.7" (record=61.5"); Jan, 23.7"
1996197 Snowfall: Nov, 36.0"; Dec, 118.0"; Jan, 13.0"

Interstate 90 closures have also been more that average. The average annual time the highway was closed from 1987- 1996 for "Avalanche Control", "Safety", and "Other" reasons was 56 hours: 48 minutes. The time closed this year up through January 20. 1997 is 185 hours:30 minutes. Not only does this further demonstrate the unusually severe weather in Cle Elum, it also impacts the material delivery as well as the ability for the crews to show up to work.

Osprey Nest

There is an Osprey nest on a Puget Power power pole near the site of well number 6. In order not to jeopardize the use of this nest by possible returning birds, we will have a window of no construction associated with well number 6 from April 15th through July 15th. This will make it necessary for this contract to remain open through July 1997.

Benefits associated with the construction of the facility:

The facility is a high quality, state of the art hatchery that will provide associated benefits to all stakeholders including the State of Washington, the Yakama Tribe, the BPA, and the public.

The designers (CH2M Hill) and the construction contractor (The Natt McDougall Co.) have been extremely responsive in working with BPA to successfully overcome the obstacles in order to complete the facility in time to start receiving fish in the Spring of 1997.

We are benefiting from BPA's "Best Buy" construction contracting practices. We initially restricted the

Request For Proposal to a short list of contractors we determined to be fully qualified to do a project of this size and complexity. We then were able to chose the contractor we determined would be the best with whom to do business. This contractor also gave us the lowest initial cost proposal and has typically presented reasonable costs for contract modifications.

There has been no dirty water going downstream. The construction has been kept environmentally clean.

The water fowl, a small herd of elk, and a few deer have all wintered over with out being disturbed.

The local economy has had a significant boost.

Tribal Employment Rights Ordinance (TERO) was included in the Construction contracts thus providing associated benefits to the Yakama Tribe.

Only tribal residential contractors were invited to submit proposals on construction of the three residential houses, again providing benefit to the Tribe.

8812001

Yakima/Klickitat Fisheries Project Management

SPONSOR/CONTRACTOR:
Mel Sampson, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
The Yakama Indian Nation, the Lead Agency through this Intergovernmental Agreement, in cooperation with its Co-manager, the Washington State Department of Fish & Wildlife, provides the Policy direction, development, and management of the Yakima/Klickitat Fisheries Project (YKFP). This is consistent with Sections 7.4K and 7.4K. 1 of the Columbia River Basin Fish and Wildlife Program of the Northwest Power Planning Council.

Upon completion of the transition to full operation of the YKFP, (see Operation Structure), the Yakama Indian Nation will maintain the core administrative functions for operation. Through this operating format, the Project functions will be categorically: Operations; includes the participatory functions of the Lead Agency, Policy Croup, WDFW, Administrative/ Support/Contracts, Project Manager, and the Science Technical Advisory Committee. Production; includes all the hatchery operations and related activities. Data / Information; includes the compilation and storage of data derived from the Modeling, Monitoring, Evaluation, Certification, Surveys, and all other pertinent Project activities. This area will also coordinate the Internet, CIS, Public Relations and the Library. Monitoring and Evaluation; includes the development and implementation of Modeling Design activities, all Monitoring related functions, Certification tasks, all Data collection functions, and. all Science related activities.

As the Project continues to progress and transition is fully realized, the specific Tasks and Functions will be assigned accordingly within the respective Departments, as previously addressed. The Yakama Indian Nation will be the operators of the Upper Yakima Supplementation Complex, and will be entering into an Operation and Maintenance Agreement with Bonneville Power Administrion. This functionwill be categorized under the Production heading above. The YKFP will continue to operate under the concept of Adaptive Management.

Currently, the emphasis is on Spring Chinook, with some monitoring and evaluation being scheduled for Coho. As other species are developed, determinations will be made on the program for them within the basin(s).

Hatchery Training and Education

SPONSOR/CONTRACTOR:
Mel Sampson, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
The Yakama Indian Nation (YIN) is a co-manager of the salmon and steelhead resources of the Columbia River Basin. The Tribe has been increasingly involved in the Fish and Wildlife Program of the Northwest Power Planning Council from its inception in the early 1980s to present day program measures. The YIN is the lead entity on several important artificial production projects including the Yakima Hatchery and four supplementation projects that have been identified by the NPPC and the US v. Oregon Policy Committee as high priority. It is a goal of the YIN to staff these projets with trained and formally educated personnel within the Yakama tribal community. This project provides the necessary framework to accomplish this goal.'

The program involves training at established hatchery facilities both on and off the Yakama Indian Reservation. The Prosser and Marion Drain hatcheries and Yakima River Coho Acclimation Complex have been utilized for fish propagation, hatchery maintenance, and project monitoring/evaluation training and experience. ,A mutual agreement between the YIN and the Oregon Department of Fish and Wildlife has resulted in on-the-job training at Bonneville Fish Hatchery in salmonid fish culture for tribal members. Institutions including Mt. Hood Community College, Heritage College, University of Washington, and Central Washington University have provided classes, education, and degrees for the projects' trainees.

8812005

Fish Passage Video Monitoring

SPONSORKONTRACTOR:
Mel Sampson; Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
The Primary focus in 1996 has been to address facility concerns at Prosser Dam which impair video monitoring. The Bureau of Reclamation (BOR) has worked closely with the YIN in making these improvements. Specifically, this has resulted in construction of shut off gates at the three fish ladders and improvements to the viewing backboards. The newly installed infrared light system at the right bank was tested against the standard fluorescent light system during the fall, 1996 fish run. Preliminary results indicate that the infrared light source improved nighttime fish passage behavior. However, the fluorescent light source provided a higher quality video image over the infrared light source. The YIN and BOR are currently discussing what future coarse should be taken with respect to the final light system.

The YIN and BOR have begun to investigate what immediate improvements (if any) can be made to the monitoring system at Prosser Dam. The two areas of interest are improved fish image quality and video storage. The two agencies are currently contracting vendors to find out what current technology exists with respect to higher resolution video cameras and digital video storage devices, what the associated costs are, and what improvements to video technology are anticipated in the next five to ten years.

The BOR purchased software that improved the user "friendliness" of video image acquisition system (VISA), however, hardware/software "bugs" still persist making the system unusable at present. Making this system operable and investigating improvements to the system is a high priority in 1997.

Results from double read video tapes indicate that most fish identification problems occur in the fall run and are consistent from year to year. Specifically, difficulty occurring with distinguishing fall chinook and coho and is more prevalent with smaller fish.

Fisheries Technician Field Activities

SPONSOR/CONTRACTOR:
Mel Sampson, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
The Yakima/Klickitat Fisheries Project (YKFP) has experienced some measurable accomplishments within the past five years. Most of these advancements required the technical support and assistance from the technician and culturist support pool.

In coordination with Washington Department of Fish and Wildlife and other YKFP contractors, the technicians have participatedin the collection of data for various tasks under the experimental design of YKFP. These activities include but are not limited to YSIS, juvenile and adult fish trap operations, spawner surveys and habitat related assignments.

The Chandler Juvenile Fish Monitoring Facility, located at the Prosser Diversion Dam (RM 47.1), is a vital aspect of the overalI monitoring and evaluation for YKFP. The baseline data collected at Chandler; stock composition of smolts, out migration timing, egg to smolt survival rates, etc., is essential in determining whether post-supplementation changes are consistent with progress toward **increased** natural production.

The Roza Adult Fish Trap, located at the Roza Diversion Dam (RM 127.9), is operated for capturing Spring Chinook broodstock for the Upper Yakima Spring Chinook Facility and for monitoring the natural escapement of Spring Chinook.

The Yakima Basin Spring Chinook, Fall Chinook, Coho and Steelhead spawner surveys provide essential information for the YKFP. Some critical information that is needed can only be attained through these surveys. Some examples of such information are; spawning escapement, e estimated egg deposition, egg-to-smelt survival, sex ratios, pm-spawning mortality and geographic spawning distribution.

8815600

Duck Valley Fish Stocking Program

SPONSOR/CONTRACTOR:

Walden Townsend, Shoshone-Paiute Tribes (702/757-3211)

GROUP:

Resident Fish

ABSTRACT:

The biological need for this program will relieve fishing pressure on the native fish that are found in the Owyhee River as well as the tributaries to the river. Also, this program will releive pressure on Billy Shaw Reservoir. This program enables tribal memebers and non-tribal memebers to catch and keep rainbow trout, this should help Billy Shaw Reservoir maintain its quality as a catch and release trophy fishery.

The Duck Valley fish stocking program will be applicable to the multi-year plan by enabling people to catch and keep the fish caught through the stocking of Mt. View Reservoir and Sheep Creek Reservoir.. This will enable the Duck Valley Reservation to maintain its trophy catch and release fishery by providing an additional fishery for people to keep fish. Also it provides an excellent chance for young anglers to get a chance to fish without the pressure of strict regulations and high fishing pressure from experienced anglers.

Willamette Hatchery Oxygen Supplementation

SPONSOR/CONTRACTOR:
Harry Lorz, ODFW (541/757-4186)

GROUP:
Anadromous Fish

ABSTRACT:
Willamette Oxygen Supplementation Project was set up in 1988 to test the use of supplemental oxygen for increasing production in a surface water hatchery. It was hoped that the retrofitting of Willamette Hatchery with oxygen supplementation could increase the yield of spring chinook salmon to the Willamette River. This would imply that existing hatcheries in the Columbia River Basin could retrofit their facilities with supplemental oxygen to increase production and help to attain the goals of the Power Planning Council.

The experimental design of the project called for replicates of seven experimental treatments. Three rearing densities would be tested: normal density for Willamette Hatchery, half normal density, and three times normal density. Oxygen supplementation would be provided to the triple density raceways as well as one pair of normal density raceways. In addition, three raceways were modified to Michigan-style raceways in which water would pass through the raceway, become aerated, and supply the next downstream raceway. Water was used three times before it was discarded. Each of these raceways was supplied with fish to provide a triple rearing density but remain at the same load as the control raceway.

Fish were introduced into the raceways in appropriate numbers in July at the time of marking with coded wire tags and fin clips. The fish were then reared until March, when they were loaded into trucks and released in the Willamette River below Dexter Dam. During rearing, extensive sampling provided information on growth, disease incidence, smolt condition, and water quality. Four brood years of fish were released. The final adult returns from these tagged groups will be complete in 1999.

At the final release in March 1994, approximately 3.7 million data points had been taken as part of the project. Analysis of these data points was undertaken while waiting for the adults to return. Major highlights of the results so far indicate:
1) lower rearing densities seem to provide better adult returns than higher densities in chinook salmon;
2) oxygen supplementation seems to increase survival in some years, but the results do not seem to be consistent and do not overcome the effects of increased rearing density;.
3) Michigan raceways appear detrimental to survival of spring chinook salmon;
4) fish reared in Michigan raceways showed significantly higher metabolic rates than those reared in regular raceways;
5) in seawater tests, fish reared in Michigan raceways showed much higher susceptibility to bacterial kidney disease;
6) ammonia production was highest in third-pass Michigan raceways, but level of unionized ammonia considered deleterious to the fish was not found;
7) pH decreases with increasing metabolic activity in surface water with little buffering capacity; consequently, ammonia levels can probably never reach limiting levels in these situations;
8) water chemistry in surface water hatcheries is completely different from that of well water hatcheries. Well water hatcheries have relatively constant water quality, whereas surface water quality

changes with environmental conditions. These changes include circannual and die1 changes in temperature, dissolved oxygen, gas saturation, hardness, pH, suspended solids, and dissolved solids.

At present, most of the data on fish growth and about one-third of the data on water quality has been analyzed. Marked adults are collected each summer and fall and tags are identified. Collection of adults should be completed in 1999. The project should result in many published articles on aspects of fish culture, one of the most extensive databases on hatchery water quality for a surface water hatchery, and clear answers to the objectives originally proposed for the project.

Effects of Coded Wire Tagging on the Survival of Spring Chinook

SPONSOR/CONTRACTOR:
Lee Blankenship, WDFW (360/902-2748)

GROUP:
Anadromous Fish

ABSTRACT:
The Hatchery Effectiveness Technical Working Group of the Columbia Basin Fish and Wildlife Authority identified the effects of coded wire tagging as one of the top priorities for investigation in 1988. An eight-year study was designed and started in 1989. Three hatcheries in the Columbia River basin were chosen as study sites. They included U.S. Fish and Wildlife Service's Carson Hatchery on the Wind River; South Santiam Hatchery in the, Willamette system; and the Washington Department of Fish and Wildlife's Cowlitz Hatchery on the Cowlitz River. The entire production for three consecutive brood years of spring chinook at these three hatcheries were otolith marked. One-third of the production was adipose marked and coded wire tagged. Coded wire tagged and unhandled controls were precisely enumerated for each brood at the time of tagging. The unhandled controls were counted through an automated counting device. The tagged to untagged ratio of returning adults is compared to the ratio at the time of tagging to determine differential survival. Scales were used to separate different untagged brood years for adult returns and otolith marks were used to separate adult strays returning to the hatcheries.

Adult returns through five-year-olds have been analyzed for the 1989 and 1990 broods thus far. The 1989 brood tagged fish from Carson Hatchery had an 8.8 % lower survival than unhandled controls. This was the only brood of six which showed tagged fish had significantly lower survival than unhandled controls. This particular group had an outbreak of II-IN and would not have been tagged under normal circumstances.

8902401

Eva1 Umatilla Basin Prj - 3=Mile/Weid Canal Scr

SPONSOR/CONTRACTOR:
Richard Carmichael, ODFW (541/962-3777)

GROUP:
Anadromous Fish

ABSTRACT:
Outdated and ineffective juvenile salmonid bypass facilities were reconstructed at five major irrigation canals on the lower Umatilla River in northeastern Oregon between 1988 and 1994. The new state-of-the-art facilities included larger rotating drum screens with reduced mesh size, improved screen seals, vertical slot bypass channels, and increased bypass pipe diameters. Evaluations of these facilities were necessary to ascertain whether changes in structural designs were fully effective in screening juvenile fish from the canals and bypassing them uninjured back to the river. From 1991 - 1995 we investigated injury and travel rate of juvenile fish moving through the facilities and screening efficiency of canal drum screens. Biological evaluations were conducted by releasing and recapturing marked yearling summer steelhead (Oncorhynchus mykiss), yearling spring chinook salmon (0. tshawytscha), and subyearling fall chinook salmon (0. tshawytscha) in varying locations within the bypass facilities. Most fish passing through bypass facilities incurred insignificant injury ($P > 0.10$); significant results (P 0.01) for some injury tests at West Extension Canal and Feed Canal bypasses were probably a result of sampling error or handling injury. Short delays in movement were associated with the headgates and outfall at West Extension Canal and the bypass pipe at Westland Canal. Screening efficiencies of drum and vertical belt screens were greater than 99.7% and 99.4%, respectively. We also tested whether juvenile fish were injured as they passed through adult fish ladder facilities that were rebuilt from a weir-and-pool design to a vertical-slot design. Subyearling fall chinook salmon were injured in the passge section of the east-bank ladder at Three Mile Falls Dam ($P = 0.04$) and in the auxiliary water system of the fish ladder at Westland Dam ($P = 0.05$). Midchannel diffusers probably caused most injury at both sites. Extensive delay in fish movement at the Three Mile Falls Dam fish ladder was associated with the midchannel diffuser in the upper passage section. In general, current designs of bypass and ladder facilities on the lower Umatilla River safely and quickly pass juvenile salmonids. However, some facility components pose passage problems for juvenile fish. We recommend regular facility maintenance, proper operation, and minor modification of some facility structures.

Power/Repay O&M f'or USBR CPR Pumping Proj

SPONSOR/CONTRACTOR:
PPL/UECA

GROUP:
Anadromous Fish

ABSTRACT:
Flow enhancement has historically been a critical companion piece to passage improvement in the Umatilla basin. The Umatilla naturally tends to dry up in the spring and remain so until rains start up again in the fall. Irrigation diversions have aggravated this situation, making it much more pronounced and serious. Adult and juvenile fish try to migrate at the very time the flows are inadequate to allow their passage due to the diversions and naturally occurring flow diminution.

To address this problem, parties in the basin (CTUIR, USBR, ODFW, OWRD, BPA, irrigation districts, and interest groups including Waterwatch and Oregon Trout) developed a water exchange program whereby irrigators are provided water from sources other than live Umatilla flow in return for allowing Umatilla live and stored flow to remain instream during critical passage periods. The program relies heavily on water exchange, conveyance and storage facilities (many of which are part of the Umatilla Basin Project, a 1988 Congressional Act authorizing Reclamation to design, construct and operate facilities), and BPA to provide power for project pumping.

The Umatilla Basin Project involves a series of pumping plants, canals and pipelines, and storage reservoirs designed to allow the water exchanges to take place. The project is being constructed in two phases. Phase 1, complete in 1995, involves an exchange with West Extension irrigation district (WEID) at Three Mile Dam. -Water is diverted at McNary Dam by aqueduct to a facility at the Umatilla River where it is pumped into the WEID canal. When the exchange is in place, WEID leaves a like amount of water in the river for fish, up to 140 cfs. Unused pump capacity can also be used by WEID for getting additional irrigation water, within their existing water permit, at times when fish don't need the water. WEID pays for this power.

Phase 2 involves exchanges with the Hermiston (HID) and Stanfield (SID) Irrigation Districts. The Hermiston piece has been complete for three years and involves HID foregoing diversions at Feed Canal diversion during critical spring and fall migration periods. An account is kept of foregone diversions and if HID is unable to divert enough water to fill Cold Springs Reservoir during the times when Feed Canal is able to take water, the difference is made up by pumping water from the Columbia River into the reservoir,

The Stanfield piece is about half complete and is expected to be done by next year. It involves exchanging with SID all their water stored in McKay reservoir, near Pendleton, and most of their live flow (to be used for fish flows) for water pumped from the Columbia. In addition to the main pumping plant at the Columbia, at least two relift pump stations are needed to raise the water up for delivery to SID's canal system. Because the Phase 2 exchange involves stored water, it gives the fish managers added flexibility to shape the water for actual fish needs.

8902900

Hood River Production Program - Pelton Ladder - Hatchery

SPONSOR/CONTRACTOR:
Trent Stickell, ODFW (503/872-5252)

GROUP:
Anadromous Fish

ABSTRACT:
This project was started as a low cost production program using, to the extent practicable, exiting facilities. The first contract addressed construction and rehabilitation efforts at Pelton Ladder to develop three new extended rearing cells. The cells were completed September, 1995 and additional spring chinook were transferred to the new cells. Plans are to use the production from two cells to re-establish spring chinook in the Hood River system and to evaluate the effect of the new cells on the existing production (Hood River Production Program - CTWS - M&E, Project #8805303). The contract was converted from a construction project to a production project in October, 1995.

The use of Pelton Ladder for rearing juvenile spring chinook has proven to be a feasibile and successful means for increasing adult returns (i.e. smolt to adult survival). Spring chinook smolts rear wel in the ladder, apparantly benefitting from the semi-natural rearing conditions. Smolts reared in the ladder have helped achieve increased adult returns to the Deschutes River Subbasin.

Effects of Acclimation on the Survival of Spring Chinook Salmon aka: Eva1 of Pre-Rel Temp Acclimation at Klickitat Htch

SPONSOR/CONTRACTOR:
Andrew Appleby, WDFW (306/902- 109 1)

GROUP:
Anadromous Fish

ABSTRACT:
It is speculated that pre-release exposure of spring chinook smolts to ambient receiving water could enhance post-release survival when compared to fish reared in ground water. This project was designed to test this theory using spring chinook smolts from Klickitat Salmon Hatchery (near Glenwood, WA). Spring chinook juveniles from four brood years were used to test two periods of acclimation (3 and 6 weeks) plus a control group. Each group contained coded-wire tagged fish to allow for smolt to adult survival estimates and fishery contributions. Measurable difference in gill atpase, estimates of smolt status, and number of adults and jacks produced were noted in the acclimated groups compared to the control groups.

8903500

Umatilla Hatchery Operations and Maintenance

SPONSOR/CONTRACTOR:
Trent Stickell, ODFW (503/872-5252)

GROUP:
Anadromous Fish

ABSTRACT:
The Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program authorized construction of the Umatilla Fish Hatchery (UFH) in 1986. Hatchery construction was 'funded by the Bonneville Power Administration and was completed in fall 1991. Umatilla Fish Hatchery was designed to produce salmon and steelhead for the Umatilla River, contribute significantly to the doubling goal in the Columbia Basin, and to test new rearing methods that could be used in other hatcheries. Rearing methods are being tested in experimental Michigan (MI) raceways and in standard Oregon (OR) raceways. Characteristics of MI raceways include triple water reuse, high water exchange rates, high rearing densities, oxygen supplementation, and baffles to promote cleaning. Since 1991 UFH has annually produced 3M fall chinook salmon, 0.3- 1.3M spring chinook salmon, and 15OK summer steelhead, but production has been less than anticipated because of a limited water supply. Water quality has been adequate and shows few differences between MI and OR raceways or between MI raceways that reuse water. The fall chinook salmon program uses Upriver Bright stock to produce subyearlings that are 60 fish/lb at release. Approximately three times as many fish have been produced per gallon of water in one MI series than in one series of OR raceways. Cold water disease was the primary health concern for fall chinook and disease problems may be exacerbated in raceways with baffles. Michigan reared fish were slightly smaller and more descaled at release than OR reared fish. The percent recovery of smolts to the John Day dam was similar for MI and OR fish and preliminary adult survival data suggests no differences between groups. Few differences have been observed among fish reared in first, second, or third pass MI raceways. The fall chinook program has provided a limited fishery in the UmatilIa River. Most returning adults are used to rebuild natural and hatchery broodstock. Adults returning from subyearling releases have strayed into the Snake River. However, mass marking with wire tags has reduced the escapement of Umatilla strays past Lower Granite Dam from more than 200 adults to less than 10 adults in 1996. The spring chinook salmon program has used Carson stock to produce subyearlings for spring and fall release, and yearlings for spring release. Bacterial kidney disease has been the primary health concern for spring chinook salmon. Subyearlings were reared in MI and OR raceways and initial data indicates poor survival. Small size at release (25-35 fish/lb) was a problem for spring release groups. The yearling program uses egg chilling to produce smolts at 8 fish/lb. Comparisons between fish reared in MI and OR raceways have not been conducted because of water and egg shortages. Preliminary data suggests poor adult survival for fish reared in OR raceways at UFH compared to fish reared at Bonneville Hatchery; however, a substantial sport fishery has developed. Tbe steelhead program at UFH uses Umatilla stock to produce smolts at 5 fish/lb for supplementation and to provide a sport fishery. Broodstock consists primarily of wild fish that are selected from a cross section of the run. Steelhead are reared in MI raceways at UFH and densities were reduced from 6 lb/ft3 to 4 lb/ft3 because of severe caudal fin erosion. No major disease problems or outbreaks have occurred in steelhead. Returns from hatchery releases are improving and approaching 1% smelt-to-adult survival. Adult survival of groups released in April is greater than survival of groups released in May. In summary, preliminary analyses suggests rearing fish in MI raceways is efficient for subyearling fall chinook salmon and summer steelhead. Rearing of yearling

chinook may be ineffective at UFH because of poor fish health, high water temperatures, and the need to chill eggs for extended periods. Partial justification for the construction of UFH was to compare the adult survival of salmonids reared in MI and OR raceways. An insufficient water supply limits production and the completion of experiments that could produce information for other Columbia River hatcheries. Alternative water supplies need to be developed at Umatilla Fish Hatchery.

8906200

Prepare Draft Annual Implementation Work Plan

SPONSOR/CONTRACTOR:
Tom Giese, CBFWF (503/326-703 1)

GROUP:
Anadromous Fish

ABSTRACT:
The Columbia Basin Fish and Wildlife Authority(CBFWA) was established as an association of four state, two federal and 13 tribal members participating to assure comprehensive regional planning and implementation of fish and wildlife programs in the Columbia River Basin. The federal and state agencies and Indian tribes of the Columbia Basin are legally recognized as managers of the fish and wildlife resources and as such have a major role in the implementation of projects which support the Northwest Power Planning Council(NPPC) Program. Specifically, it relates to the NPPC Program Measure 3. lB, 3.3El and l0.2D and benefits Program coordination and planning, basin-wide Program coordination and education. The CBFWA members represent a powerful consortium for regional consensus in the Columbia River Basin. The CBFWA works collaboratively and cooperatively with the NPPC and the Bonneville Power Aclministration(BPA) on the regional goal of protecting, mitigating and enhancing the fish and wildlife resources of the Columbia Basin. The three general areas of involvement for the fish and wildlife managers through the CBFWA are:
Coordinate interagency activities of the Columbia River Basin between the federal and state agencies and Indian tribes or their tribal coordinating entity.
Provide a centralized, regional entity for coordinating the members's role in the design and implementation of the NPPC Fish and Wildlife Program.
Coordinate activities between the CBFWA and all of the water and land planning and management authorities of the Columbia River Basin.
Specifically, the CBFWA has the responsibly of preparing the Draft Annual Implementation Work Plan which involves coordinating and facilitating the fish and wildlife managers in the development of a prioritized list of projects which in the members opinion best reflect the NPPC Fish and Wildlife. Program for protecting, mitigating and enhancing the fish and wildlife resources in the Columbia Basin. CBFWA actively works with its members and interacts collaboratively with BPA and NPPC to provide program and project accountability. The CBFWA is currently working on a Multi-Year Implementation Planning effort, with active participation of other agencies that integrates fish and wildlife programs, budgets, goals, objectives and a uniting conceptual framework for the basin through the 2001 planning horizon.

Annual Fish Marking Program-Missing Hatchery Production Groups OR/WA/ID (USFWS)

SPONSOR/CONTRACTOR:
Walt Ambrogetti, USFWS (360/696-7605)

GROUP:
Anadromous Fish

ABSTRACT:
In September 1989 the Oregon Department of Fish and Wildlife received a grant from the Bonneville Power Administration to begin a project of annually coded-wire tagging production groups of anadromous salmonids not currently tagged, The goal of this program is to develop the ability to estimate hatchery production survival values and evaluate the effectiveness of Oregon hatcheries. To accomplish this goal, work has progressed under three objectives.

Objective 1. Implement the project by tagging juvenile salmon within hatcheries to assure each , production group is identifiable to allow future evaluation upon recovery of tag data.
Objective. 2. Recover coded-wire tags from snouts of fish tagged under Objective 1.
Objective 3. Prepare an annual report for all Oregon fish hatcheries in the Columbia Basin in a Propagation Evaluation Format.

This project began in 1989 to coded-wire tag groups of 1988 brood juvenile anadromous salmon produced-at Oregon hatcheries. As the tagged fish mature and are captured in various fisheries or return to release/recapture facilities, they are sampled to recover the coded-wire tags. This data is used to estimate survival rates and catch contribution rates for each production lot of fish reared and released at each hatchery. Survival and contribution data is used to evaluate effectiveness of each hatchery and various rearing and release practices conducted by the hatcheries. Evaluation of the various hatchery and natural production projects will be necessary to measure the effectiveness of any mitigation program and to help direct future efforts in maintaining or enhancing fish runs in the Columbia Basin. This information will also be valuable to'salmon harvest managers in developing scenarios that will allow harvest of excess hatchery fish while protecting threatened and endangered natural stocks.

Through this project we have achieved full production monitoring of ODFW Columbia Basin coho and chinook hatchery programs, through the use of coded-wire tags. Since the projects beginning in 1989 through 1996, BPA has provided $952,964 for this project. During this time period the program has funded coded-wire tagging of over 7.5 million juvenile salmon, with current plans for 850,000 to 900,000 fish tagged each year. So far we have recovered over 16,000 tags from fish coded-wire tagged under this project.. Data from this project is available to Columbia River salmon managers and all other interested persons through the Pacific States Marine Fisheries Commission on-line database and through the projects annual report.

8966600

Ann Cd Wire Tag Prog-Missing Prod WA Htch (WDF)

SPONSOR/CONTRACTOR:
Howard Fuss, WDFW (360/902-2664)

GROUP:
Anadromous Fish

ABSTRACT:
In the Northwest Power Planning Council's "Amendments to the Columbia River Basin Fish and Wildlife Program," specific amendments recommended that the Bonneville Power Administration fund a project to develop mass-marking methods for salmon. The amendments stated that the mass marking methods should meet the following criteria: 1) the mark should be applied without handling individual fish or causing significant stress; 2) the mark should endure throughout the life cycle of the fish; 3) the mark should be readable without killing the fish bearing the mark; and 4) the methods are inexpensive enough to permit the marking, sampling, and processing of a representative sample of recovered marks at a reasonable cost."

A multi-disciplinary team of biologists, engineers and physicists collaborated to develop an automated marking system. Two years were spent investigating the use of lasers as a possible marking tool. Good marks were made with a laser by bleaching the melanophores. The marks only lasted one year, however. The research team switched its efforts to developing a machine that would adipose mark and apply a coded wire tag to salmonids without human handling, without anesthesia, at a rate of two fish per second, and at a cost significantly less tban it would cost to do manually. A machine has been built and successfully tested which meets most of the original goals. Project personnel believe additional work involving design and software modifications will allow the machine to meet all of the-goals and provide a machine that will revolutionize the way we process and handle fish for adipose marking, coded wire tagging, and disease control.

Ann Cd Wire Tag Prog-Missing Prod OR Htch (ODFW)

SPONSOR/CONTRACTOR:
Mark Lewis, ODFW (541/737-7637)

GROUP:
Anadromous Fish

ABSTRACT:
In September 1989 the Oregon Department of Fish and Wildlife received a grant from the Bonneville Power Administration to begin a project of annually coded-wire tagging production groups of anadromous salmonids not currently tagged. The goal of this program is to develop the ability to estimate hatchery production survival values and evaluate the effectiveness of Oregon hatcheries. To accomplish this goal, work has progressed under three objectives.

Objective 1. Implement the project by tagging juvenile salmon within hatcheries to assure each production group is identifiable to allow future evaluation upon recovery of tag data.

Objective 2. Recover coded-wire tags from snouts of fish tagged under Objective 1.

Objective 3. Prepare an annual report for all Oregon fish hatcheries in the Columbia Basin in a Propagation EvaIuation Format.

This project began in 1989 to coded-wire tag groups of 1988 brood juvenile anadromous salmon produced at Oregon hatcheries. As the tagged fish mature and are captured in various fisheries or return to release/recapture facilities, they are sampled to recover the coded-wire tags. This data is used to estimate survival rates and catch contribution rates for each production lot of fish reared and released at each hatchery. Survival and contribution data is used to evaluate effectiveness of each hatchery and various rearing and release practices conducted by the hatcheries. Evaluation of the various hatchery and natural production projects will be necessary to measure the effectiveness of any mitigation program and to help direct future efforts in maintaining or enhancing fish runs in the Columbia Basin. This information will also bevaluable to salmon harvest managers in developing scenarios that will allow harvest of excess hatchery fish while protecting threatened and endangered natural stocks.

Through this project we have achieved full production monitoring of ODFW Columbia Basin coho and chinook hatchery programs, through the use of coded-wire tags. Since the projects beginning in 1989 through 1996, BPA has provided $952,964 for this project. During this time period the program has funded coded-wire tagging of over 7.5 million juvenile salmon, with current plans for 850,000 to 900,000 fish tagged each year. So far we have recovered over 16,000 tags from fish coded-wire tagged under this project. Data from this project is available to Columbia River salmon managers and all other interested persons through the Pacific States Marine Fisheries Commission on-line database and through the projects annual report.

Independent Scientific Group Support

SPONSOR/CONTRACTOR:
Dr. Charles Coutant, U.S. Department of Energy (615/576-6830)

GROUP:
Anadromous Fish

ABSTRACT:
This project provides funding for one member and the independent Scientific Advisory Board, (ISAB) through a contract with the Department of Energy. The ISAB is jointly established by the Northwest Power Planning Council (NPPC) and the National Marine Fisheries Service (NMFS). ISAB will provide independent scientific advice and recommendations regarding scientific and technical issues posed by the respective agencies on matters related to their fish and wildlife programs. The NPPC has specified a series of tasks in its Fish and Wildlife Program of December 1994 (section 3.2), while NMFS has statutory obligations under the Endangered Species Act and other federal laws. The ISAB will address scientific and technical issues relating to the NPPC fish and wildlife program and the NMFS recovery program for Snake River salmon and other anadromous fish stocks, including related marine areas. It is understoodthat the interests of NMFS relate particularly to anadromous fish conservation and management, while those of NPPC include all fish and wildlife populations affected by operation and development of the hydroelectric system.

Genetic Monitoring and Evaluation of Snake River Salmon and Steelhead

SPONSOR/CONTRACTOR: .
Robin Waples, NMFS (206/860-3254)

GROUP:
Anadromous Fish

ABSTRACT:
Although supplementation is seen by many as a key to restoring depressed anadromous fish runs, there are still substantial gaps in our knowledge of how to supplement natural populations effectively. Among the most important (yet least understood) factors to consider are the genetic consequences of releasing hatchery-reared fish into the wild. The present study addresses this issue through annual monitoring of genetic characteristics in hatchery, natural (supplemented), and wild (unsupplemented) populations of Snake River chinook salmon and steelhead. The study provides insight into common, practical management questions such as, How similar genetically are the hatchery stock and the targeted natural population(s), and how does this relationship change over time? Is there fine-scale stock structure that may be at risk from certain broodstock collection or release strategies? Are there indications that supplementation is genetically impacting wild populations that -were not intended to be affected? Is there evidence for erosion of genetic diversity in hatchery and/or natural populations?

Results of the study emphasize the importance of genetic monitoring to evaluate the consequences of supplementation, because these consequences are difficult to predict. For example, genetic effects of straying by Lookingglass Hatchery fish can be detected in natural populations of spring chinook salmon throughout the Grande Ronde basin, but we have found little evidence for genetic impact of Dworshak Hatchery steelhead on natural populations in the Clearwater Basin, even in areas where they have been outplanted. Other important results obtained to date include the following: 1) Genetic variation has been detected at over 35 gene loci in chinook salmon and over 45 gene loci in steelhead, both considerable increases over previous reports for Snake River populations; in addition, a number of new nuclear and mitochondrial DNA markers have been developed; 2) Significant population subdivision occurs in both species, and temporal genetic differences between years are smaller than differences among populations; 3) In chinook salmon, genetic differences between spring- and summer-run fish are a minor component of total diversity among populations; 4) In both species, some hatchery populations are genetically similar to natural populations targeted for supplementation, but others are quite different; 5) Estimates of effective population size in chinook salmon based on genetic data suggest that the ratio of effective : total population size is approximately 0.1 - 0.4 in natural populations and slightly higher in hatcheries; 6) Techniques to isolate DNA from archived scales provide an opportunity to retrospectively examine population genetic parameters in pre-supplementation populations.

8909800

Idaho Supplementation Studies (ISS)

SPONSOR/CONTRACTOR:
Al Van Vooren, IDFG (208/334-3791)

GROUP:
Anadromous Fish

ABSTRACT:
The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 30 streams throughout the Salmon River and Clearwater River basins. The entities involved include: the Idaho Department of Fish and Game, the U.S. Fish and Wildlife Service, the Nez Perce Tribe, and the Shoshone-Bannock Tribes. All of these groups are working to help define the potential role of chinook salmon supplementation in managing Idaho's natural populations of spring and summer chinook, and to identify genetic and ecological impacts on existing natural populations.

Sampling was initiated in 199 1. Baseline information was collected , and the implementation phase began in 1992. The original study design called for a minimum of 15 years of research (three generations). In spite of large scale hatchery releases in Idaho, natural chinook salmon populations are not increasing and supplementation strategies for particular river systems are still not developed.

The study has provided the following results to date (from control and treatment streams all over the state): enumeration of emigrating juvenile chinook salmon; spawning escapement estimates; documentation of redd numbers, and distributions of redds in various streams; parr population estimates; information on returns from parr vs. smolt releasestreams; and collecting and tagging of juvenile chinook salmon to determine migration and survival rates. Data on the actual genetic and ecological impact of supplementation on the naturally spawning populations is not yet complete.

One of the variables which may affect naturally spawning populations is developmental stage, which is one of the factors evaluated in this cooperative study. Supplementation strategies (broodstock and release stage) are being evaluated to determine the quickest and highest response in natural production without adverse effects on productivity. There is need for further evaluation, so that year to year variation and water condition effects can be taken into account.

The unique aspects of this project are the cooperative interagency nature of the work, and the scale of work involving multiple stream systems, of varying habitat quality and productivity. No single evaluation of this magnitude has ever been done before. The data gained from this effort will be used to provide more insight in 'guiding supplementation efforts.

Salmon Supplementation Studies in Idaho Rivers -USFWS

SPONSOR/CONTRACTOR:
Ralph B. Roseberg, USFWS (208/476-7242)

GROUP;
Anadromous Fish

ABSTRACT:
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8909802

Salmon Supplementation Studies in Idaho Rivers - Nez Perce Tribe

SPONSOR/CONTRACTOR:
Jay Hesse, Nez Perce Tribe (208/476-9502)

GROUP:
Anadromous Fish

ABSTRACT:
The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 30 streams throughout the Satmon River and Clearwater River basins. The entities involved include: the Idaho Department of Fish and Game, the U.S. Fish and Wildlife Service, the Nez Perce Tribe, and the Shoshone-Bannock Tribes. All of these groups are working to help define the potential role of chinook salmon supplementation in managing Idaho's natural populations of spring and summer chinook, and to identify genetic and ecological impacts on existing natural populations.

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Salmon Supplementation Studies-in Idaho Rivers - Shoshone-Bannock Tribes

SPONSOR/CONTRACTOR
Mike Rowe, Shoshone-Bannock Tribes (208/238-3757)

GROUP:
Anadromous Fish

ABSTRACT:
The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 30 streams throughout the Salmon River and Clearwater River basins. The entities involved include: the Idaho Department of Fish and Game, the U.S. Fish and Wildlife Service, the Nez Perce Tribe, and the Shoshone-Bannock Tribes. All of these groups are working to help define the potential role of chinook salmon supplementation in managing Idaho's natural populations of spring and summer chinook, and to identify-genetic and ecological impacts on existing natural populations.

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8910700

Epidemiological Survival Method

SPONSOR/CONTRACTOR:

. Dr. John Skalski, Univ/WA (206/616-485 1)

GROUP:

Anadromous Fish

ABSTRACT:

The goal of this ongoing study is to serve as a statistical vanguard for the PIT-tag survival studies so that field studies have a high rate of successful implementation and interpretation. This project continues to successfully serve this role, from the beginning when the PIT-tag ability to mark fish was first recognized through current efforts.

This project was one of the initial studies to look at the feasibility of performing smolt survival studies using PIT-tagged juveniles in the Snake-Columbia River Basin. Initial evaluations looked at the robustness of estimators and variances to potential model violations associated with smolt behavior and passage through hydroelectric facilities. Other issues addressed included siting of PIT-tag facilities, evaluation of detection rates, and the feasibility of releasing sufficient sample sizes for precise and accurate estimates of smolt survival. The culmination of these statistical underpinnings for the smolt survival studies was the development of user-friendly, interactive statistical software for the design and analysis of PIT-tag studies; The software does not merely provide estimates of survival and associated variances but also allows researchers to investigate relationships between survival and environmental and individual-based covariates. This software is advanced enough to analyze not only current juvenile tagging data but also eventual adult return information to obtain survival rates from river-to-ocean-to-river again. Software to test model assumptions and provide guidance on sample sizes of releases are also available. This project has contributed to the ongoing success of the National Marine Fisheries Service smolt survival studies on the Snake River 1993-97, and has provides guidance to other parties conducting smolt research. The SURPH (SURvival with Proportional Hazards) software is currently being used worldwide to analyze tagging data from virtually all taxonomic orders of aquatic and terrestrial life.

Ongoing project efforts are responding to current user group needs for the analysis of PIT-tag data. The success of current PIT-tag studies has produced a proliferation of new investigations and questions being addressed. Among current efforts include development of new tagging models for the analysis of fall chinook (i.e., subyearling) outmigration over typically two years and the occurrence of residualization among smolt; development of improved confidence interval estimators using nonparametric and profile likelihood approaches; development of the statistical framework to convert the myriad of survival estimates into a season-wide survival estimate along with valid variance estimates; extending the software to analyze individual covariates measured on fish that are released and reintercepted downstream, and the analysis of very large datasets consisting of 40-60 release groups simultaneously to look at survival relationships.

Monitoring and Evaluation Modeling Support

SPONSOR/CONTRACTOR:
James Anderson, Univ/WA (206/543-4772)

GROUP:
Anadromous Fish

ABSTRACT:
A program goal is develop, calibrate and validate models on salmon life history including egg to smolt survival, smolt downstream migration, estuary survival, ocean migration and harvest, upstream adult migration, adult spawning. The passage model (CRiSPl) tracks fish downstream movement and dam passage. It uses environmental properties including dissolved gas, temperature, flow, velocity, and identifies reservoir mortality in terms of predation, gas bubble disease. The model travel time is calibrated with PIT tag data. Survival was calibrated with smolt consumption data and validated with independent brand and PIT tag survival studies extending 30 years. The harvest model (CRiSP.2) simulates year-to-year harvest of hatchery and wild salmon from troll, net, and sport fisheries: Stocks interact through annual catch ceilings imposed upon multiple stock fisheries. It includes fixed escapement goals, time/area closures, size limits, and brood year survival rates. Migration and growth elements are being included so the model will be useful for selective fisheries management.

Our internet tool, Data Access in Real Time (DART), provides an interactive data resource for research and management of Columbia Basin salmon and their environment. Information is brought in daily from federal and state databases to provide comprehensive information and modeling tools. Daily data plus historic information dating back to 1960 are accessible on-line. The DART page also predicts the percent of a run passing the dams on any given day, estimates of survival through the year and predictions of the level of dissolved gas expected.

A reservoir food web assessment is being developed that is based on a stable isotope analysis technique we have developed that identities multiple pathways in a river food web. This work will be useful as a quantitative normative river measure.

9000500

Umatilla Hatchery - Monitoring/Eval Projects

SPONSOR/CONTRACTOR:
Richard Carmichael, ODFW (541-962-3777)

GROUP:
Anadromous Fish

ABSTRACT:
The Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program authorized construction of the Umatilla Fish Hatchery (UFH) in 1986. Hatchery construction was funded by the Bonneville Power Administration and was completed in fall 1991. Umatilla Fish Hatchery was designed to produce salmon and steelhead for the Umatilla River, contribute significantly to the doubling goal in the Columbia Basin, and to test new rearing methods that could be used in other hatcheries. Rearing methods are being tested in experimental Michigan (MI) raceways and in standard Oregon (OR) raceways. Characteristics of MI raceways include triple water reuse, high water exchange rates, high rearing densities, oxygen supplementation, and baffles to promote cleaning. Since 1991 UFH has annually produced 3M fall chinook salmon, 0.3-1.3M spring chinook salmon, and 150K summer steelhead, but production has been less than anticipated because of a limited water supply. Water quality has been adequate and shows few differences between MI and OR raceways or between MI raceways that reuse water. The fall chinook salmon program uses Upriver Bright stock to produce subyearlings that are 60 fish/lb at release. Approximately three times as many fish have been produced per gallon of water in one MI series than in one series of OR raceways. Cold water disease was the primary health concern for fall chinook and disease problems may be exacerbated in raceways with baffles. Michigan reared fish were slightly smaller and more descaled at release than OR reared fish. The percent recovery of smolts to the John Day dam was similar for MI and OR fish and preliminary adult survival data suggests no differences between groups. Few differences have been observed among fish reared in first, second, or third pass MI raceways. The fall chinook program has provided a limited fishery in the Umatilla River. Most returning adults are used to rebuild natural and hatchery broodstock. Adults returning from subyearling releases have strayed into the Snake River. However, mass marking with wire tags has reduced the escapement of Umatilla strays past Lower Granite Dam from more than 200 adults to less than 10 adults in 1996. The spring chinook salmon program has used Carson stock to produce subyearlings for spring and fall release, and yearlings for spring release. Bacterial kidney disease has been the primary health concern for spring chinook salmon. Subyearlings were reared in MI and OR raceways and initial data indicates poor survival. Small size at release (25-35 fish/lb) was a problem for spring release groups. The yearling program uses egg chilling to produce smolts at 8 fish/lb. Comparisons between fish reared in MI and OR raceways have not been conducted because of water and egg shortages. Preliminary data suggests poor adult survival for fish reared in OR raceways at UFH compared to fish reared at Bonneville Hatchery; however, a substantial sport fishery has developed. The steelhead program at UFH uses Umatilla stock to produce smolts at 5 fish/lb for supplementation and to provide a sport fishery. Broodstock consists primarily of wild fish that are selected from a cross section of the run. Steelhead are reared in MI raceways at UFH and densities were reduced from 6 lb/ft3 to 4 lb/ft3 because of severe caudal fin erosion. No major disease problems or outbreaks have occurred in steelhead. Returns from hatchery releases are improving and approaching 1% smolt-to-adult survival. Adult survival of groups released in April is greater than survival of groups released in May. In summary, preliminary analyses suggests rearing fish in MI raceways is efficient for subyearling fall chinook salmon and summer steelhead. Rearing of yearling

chinook may be ineffective at UFH because of poor fish health, high water temperatures, and the need to chill eggs for extended periods. Partial justification for the construction of UFH was to compare the adult survival of salmonids reared in MI and OR raceways. An insufftcient water supply limits production and the completion of experiments that could produce information for other Columbia River hatcheries. Alternative water supplies need to be developed at Umatilla Fish Hatchery.

9000501

Umatilla Basin Natural Production Monitoring and Evaluation (UBNMPE)

SPONSOR/CONTRACTOR;
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

ABSTRACT:
The goals of this project are to assess adult salmon and steelhead passage over major diversion dams, monitor and evaluate the restoration of naturally producing salmon and steelhead runs, and monitor tribal harvest of adult salmon and steelhead. This BPA funded project is a primary evaluation component of the Umatilla River Basin Fisheries Restoration Project developed by the Confederated Tribes of the Umatilla Indian Reservation and the Oregon Department of Fish and Wildlife in cooperation with BPA.

Radio telemetry was used from 1993 through 1996 to evaluate the movements of adult sahnonids past five diversion dams in the lower Umatilla River, and to determine migrational movements of salmonids following upstream transport. Steelhead, fall chinook, spring chinook and coho salmon were all consistently delayed at Feed Canal Dam at river mile (RM) 28.2. Delays at Feed Canal Dam were 6 to 50 times longer than delays at other dams. Fall chinook and coho salmon often fell-back and forth over the diversions at RM 27.2,28.2 and 32.4. Afier being delayed at Feed Canal Dam, steelhead generally moved upstream without falling back. Some spring chinook-salmon moved back and forth over the diversions while others did not. After transport and release upstream, adult steelhead migrated like non-transported steelhead. Ten percent of radio tagged spring chinook fell back 30 to 50 miles after transport and release. Their downstream movement was limited by dams, water extractions and high water temperatures.

Intensive spawning surveys were conducted from June through September for spring chinook salmon, November and December for fall chinook and coho salmon, and from March through May for summer steelhead. During the winter, high turbid flows often prevent extensive monitoring. Natural- spawning of adult spring chinook salmon occurs primarily in-the upper 14 miles of the Umatilla River during August and September (peaks in early September). Pre-spawning mortality of spring chinook is water temperature related and ranges from 15 to 85% (depending on reach). Spring chinook naturally deposited 400,000 eggs in 1995 (90 redds) and 1.5 million eggs in 1996 (347 redds). Fall chinook and coho salmon spawning occurs during November and December from RM l-75 with little pre-spawning mortality (usually < 5%). In the Umatilla River, fall chinook salmon naturally deposited one million eggs in 1994 and 900,000 eggs in 1995. Coho salmon deposited 880,000 eggs in 1994 and 120,000 eggs in 1995. Steelhead spawn primarily in the headwater tributaries during March, April and May and naturally deposit between two and six million eggs annually; Habitat and salmonid abundance surveys were conducted throughout the Umatilla River Basin. High densities of natural spring chinook salmon and steelhead (50-400 fish/l00 m2) were found in quality habitat in the headwaters of the Umatilla River and tributaries. The lower tributaries and mainstem reaches were degraded, polluted, channelized, dammed and de-watered and provided almost no summer rearing habitat.,

The outmigration of naturally produced juvenile anadromous salmonids was monitored with trapping, marking and recapturing techniques. CTUIR and ODFW, in a cooperative project, have monitored natural salmonid outmigration for three years. Naturally produced spring chinook salmon and steelhead begin migrating from the headwaters in October and November and resume again in March, April and May. Coho, spring chinook and steelhead generally migrate from the-lower river during April and May. Naturally produced fall chinook salmon migrate to the Columbia from mid May to mid July.

We examined scales taken from naturally produced salmonid parr, smolts and adults. Scales indicate that most steelhead migrate to the ocean at ages 2 (86%) and 3 (11%). Age at ocean entry of returning steelhead adults was 64% at age 2 and 36% at age 3. Approximately 50-55% of Umatilla River wild steelhead rear two years in the ocean (45-50% one year). Naturally spawned spring chinook immigrate primarily at age 1 and return primarily at ages 4 and 5. Natural coho migrate primarily at age 1 and return primarily at age 3. Natural fall chinook salmon migrate at age 0 and return primarily at ages 4 and 5.

Tribal harvest of salmon and steelhead was monitored each year since 1993. Tribal anglers harvest 30 to 40 steelhead annually. Approximately 105 and 175 spring chinook salmon were harvested by tribal anglers during the 1993 and 2996 seasons respectively.

9001800

Habitat Improvement - Lake Roosevelt

SPONSOR/CONTRACTOR:
Kirk Truscott, Colville Confederated Tribes (509/634-8845)

GROUP:
Resident Fish

ABSTRACT:
The Confederated Tribes of the Colville Reservation, the Spokane Indian Tribe and the Washington Department of Fish and Wildlife developed a fisheries enhancement program that was amended into the Northwest Power Planning Council's Fish and Wildlife Program in 1987. The enhancement plan included the Lake Roosevelt Rainbow Trout Habitat/Passage Improvement Project as resident fish substitution for anadromous fish losses due to the Federal Hydropower System, particularly the construction of Grand Coulee Dam. The goal of the project is to increase the natural production of adfluvial rainbow trout in tributaries to Lake Roosevelt through habitat and fish passage improvements in the tributaries. Specific objectives include:
(1) Provide increased parr production consistent with habitat availability to help achieve a 12,000 fish harvest of adfluvial rainbow trout from the Lake Roosevelt system by the year 2000;
(2) Manage adfluvial rainbow trout populations as self-sustaining populations (escapement of 6,000 adults to Lake Roosevelt tributaries by the year 2000);
(3) Identify future habitat / passage improvement opportunities in the blocked areas above Grand Coulee Dam;
(4) Provide monitoring and evaluation of habitat / passage improvements toenhance future habitat/passage projects throughout the basin.

The project includes three phases: (phase I - the development of a habitat / passage improvement implementation plan; (2) the implementation of selected actions / projects from the implementation plan and (3) monitoring and evaluation of the project implementation. Phase I and II were completed in 1992 and 1995 respectively. Phase II implementation activities conducted on 5 tributaries to Lake Roosevelt affecting 20.9 miles of stream course included, in-stream habitat improvements, channel reconfiguration (increased-sinuosity), in-stream passage improvements (re-installation of 4 improperly installed culverts), riparian plant stocking (approximately 4,500 plants) and livestock exclusion within the riparian area (4.5 miles of fence). Spawning and rearing habitat quantity has been increased by 11 miles through passage improvements alone. Additional benefits to parr production is expected through habitat quality improvements such as improved riffle-pool ratios, improved summer / winter pool habitat, improved in-stream cover, longer duration of late-summer flows and improved riparian habitat. The current project scope includes phase III, which began in 1996 and will continue through the year 2000. Phase III will develop a comparative analysis of pre and post implementation of habitat and passage improvements by observing fish populations both adult and juvenile in all 5 study streams, examining passage improvement effectiveness, in-stream habitat effectiveness on channel morphology and fish utilization and effectiveness of riparian plant stocking.

Strm Survey, Htchry, Hab Improv, Mntr Coeur D

SPONSOR/CONTRACTOR:
Kelly Lillingreen, Coeur d'Alene Tribe (208/686-5302)

GROUP:
Resident Fish

ABSTRACT:
The Bonneville Power Administration (BPA) is funding necessary stream habitat improvement projects on tributaries within the Coeur d'Alene Indian Reservation to facilitate recovery of west slope cutthroat and bull trout populations. Baseline stream surveys conducted from 1990-1994 have identified several population limiting factors, including high summer water temperatures, suboptimal baseflows, reductions in pool volume, and low abundance of woody debris. Critical habitat areas have been identified based on existing land use patterns and cutthroat trout abundance and distribution. Recommendations for treating limiting factors are presented as a two phase implementation process. Phase one emphasizes watershed restoration techniques including changing land use practices that are causing habitat degradation, and re-establishing riparian/stream linkages. Phase two involves active manipulations of habitat structure that address site specific problems; Restoration strategies combine conservation of remaining high quality habitat, reclamation of degraded riparian and upland areas, and development of interim harvest opportunities.

9005200

Perf/Stock Prod Impacts of Hatchary Suppl

SPONSOR/CONTRACTOR:
Reg Reisenbichler, National Biological Service (206/526-6282)

GROUP:
Anadromous Fish

ABSTRACT:
Various studies have shown or strongly suggested genetic differences between hatchery and wild salmon in aggressive behavior, time of spawning, temperature adaptation, position in the water column, predator avoidance, egg size, and adult morphology and. secondary sexual characters. Unfortunately, these studies provide almost no basis for quantifying the genetic differences in fitness for natural spawning and rearing. Without measures of fitness, one cannot quantitatively predict the consequences of supplementation on the productivity of natural spawning fish, nor the expected production from a supplementation program. Only two published studies, both with steelhead, provide measures of differences in survival or reproductive success between hatchery and wild fish. I briefly describe our Performance/Stock Productivity Study and how it is complementing the data from the two published studies to provide a basis for predicting the long-term consequences of supplementation. Among other results, the preliminary model used for this prediction suggests that the long-term consequences for steelhead will require more than 20 years to be manifested. Supplementation programs, including their evaluations, should be designed in light of the likely magnitude and time-scale of long-term consequences. The Performance/Stock Productivity Study also is providing the first tests for genetic differences in growth and survival between hatchery and wild chinook salmon, and an evaluation of a progressive hatchery program to minimize genetic differences between hatchery and wild fish.

Steelhead Supplementation Studies in Idaho Rivers.

SPONSOR/CONTRACTOR:
Alan Byme, IDFG (208/465-8404)

GROUP:
Anadromous Fish

ABSTRACT:
The goal of supplementation is to use artificial propagation to increase natural fish production without a negative effect on the productivity and abundance of existing natural populations. Supplementation has been identified to generate much of the planned anadromous fish run increases in the Columbia River Basin. Although a sustainable benefit from supplementation is unlikely without improvement in mainstem passage, supplementation may contribute in rebuilding Idaho steelhead populations. The goal of supplementation: an'increase in natural production, is a departure from previous hatchery management. Guidelines 'and procedures for supplementation are not established. This project was designed to investigate potential benefits and risks with small-scale experiments and to develop protocols for biologically sound steelhead supplementation.

The major objectives of this research are:

1. Assess the performance of hatchery and wild brood sources to reestablish steelhead in streams where extirpated.

Because of the low escapement of wild steelhead in recent years', we have not compared a wild stock with a hatchery stock, as planned. We have stocked hatchery adults and have documented an increase, in juvenile abundance in the study streams.

2. Evaluate the ability of returning adults from hatchery smolt and fingerling releases to produce progeny in natural streams.

We have stocked hatchery fingerlings annually since 1993 and have documented an increase in juvenile abundance. The first hatchery smolt release was made in 19% and will continue yearly until 1999. The first returning adults from these stockings are expected in 1998.

3. Assess the abundance, habitat, and life history characteristics of existing wild and natural steelhead populations in the Salmon and Clearwater rivers' drainages.

We have PIT-tagged 20,000 wild steelhead at screw traps operated by this study and other Idaho Department of Fish and Game crews since 1993. We intensively snorkel 8 - 11 streams annually to track juvenile steelhead abundance. We operate an adult weir and monitor juvenile production in Fish Creek. We will begin collecting samples for a statewide genetic analysis of our steelhead stocks this year.

9006900

Yakima Hatchery - Final Design

SPONSOR/CONTRACTOR:
Robert Gatton, CH2M Hill (206/453-5000)

GROUP:
Anadromous Fish

ABSTRACT:
CH2M-Hill is under contract with the Bonneville Power Administration to provide design and technical support for the Cle Elum Hatchery and the Jack Creek, Easton, and Clark Flat Acclimation sites. These facilities in combination with the Roza adult trap are required to implement the Yakima Fisheries Project, Upper Yakima Spring Chinook program,

The majority of the construction of Cle Elum Hatchery will be completed in April 1997. Two additional wells will be added to the four completed wells in July 1997. A potential River Water Cooling Facility (RWCF) will be added if required in 1998. The total capital construction for the Cle Elum Hatchery will be approximately $16,000,000 with the potential of $3,500,000 additional for the RWCF. The three acclimation sites are currently budgeted at $7600,000. Clark Flat and Easton are located on the Yakima river approximately 12 miles upstream and downstream of the Cle Elum Hatchery. Jack Creek is located 10 miles north of Cle Elum on the North Fork Teanaway River. Final design and construction of the acclimation sites will occur in Fiscal Year 1998.

Professional services provided under this contract include criteria development, site selection, preliminary design, permit application preparation, ground water investigations, advanced computer system design, final design and services during construction. Details of these components of the design will be explained in the project presentation.

Northern Squawfish Management Program

SPONSOR/CONTRACTOR:
Russell Porter, PSMFC **(503/650-5400)**

GROUP:
Anadromous Fish

ABSTRACT:
Research from 1983-86 indicated-that 7-17% of all juvenile salmonids entering John Day Reservoir were lost to predation, and that northern squawfish Ptychocheilus oregonensis were responsible for 78% of the loss. Research from 1990-93 showed that predation occurred throughout the lower Columbia and Snake rivers, and that in many areas losses of juvenile salmonids were greater than in John Day Reservoir. Additional research indicated that sustained annual exploitation of 10-20% of northern squawfish 275 mm fork lengthcould reduce predation up to 50%. These findings led to test fisheries for northern squawfish in 1990, and to full&ale implementation of public sport-reward and agency-operated dam-angling fisheries in 1991. A limited gill-net fishery began operation in 1993. From 1990-96, 1.1 million northern squawfish were harvested throughout the lower Columbia and Snake rivers, at an annual exploitation rate averaging 12.1% (range 8.1 - 15.5%). The sport-reward fishery contributed 84% of the total exploitation; however, dam-angling and gill-net fisheries harvested larger fish and exploited localized concentrations. Density and size structure of northern squawfish decreased in some areas in response to removals. Surviving northern squawfish did not exhibit increased consumption of juvenile salmonids, growth, relative weight, or fecundity. Smalhnouth bass Micropterus dolomieu and walleye Stizostedion vitreum biological characteristics exhibited annual variation, but no trends of decreased mortality, or increased density, consumption, size structure, relative weight, growth, or recruitment. Response of northern squawfish, combined with lack of response by other predators indicates that potential predation on juvenile salmonids by northern squawfish has decreased to approximately 62% of levels prior to removals, Exploitation of northern squawfish will continue to be monitored annually for the duration of the fisheries, and response of surviving northern squawfish, smallmouth bass and walleye will be evaluated every 3-5 years.

9 0 0 7 8 0 0

System-Wide Significance of Predation on Juvenile Salmonids in Columbia and Snake River Reservoirs and Evaluation of Predation Control Measures

SPONSOR/CONTRACTOR:
Dena Gadomski/Tom Poe, National Biological Service (509/538-2299)

GROUP:
Anadromous Fish

ABSTRACT:
This project was initiated in 1990 and has accomplished several different goals related to system-wide significance of predation and evaluation of predation management programs. First, in a cooperative effort between ODFW, WDFW, and USFWS/USGS, we determined the relative magnitude of losses of outmigrating juvenile salmonids to northern squawfish in reservoirs throughout the Columbia River Basin. This work was completed in 1995. Second, we have been studying the early life history of northern squawfish in the basin and examining mechanisms underlying squawfish recruitment. This work will be completed by 1998. Finally, we have been providing data, reviews, methodology, and analyses for evaluating the predator removal program begun in 1991. So far, over 15 peer-reviewed papers and technical reports have been produced, documenting milestones of this project. Methods developed through this project have been used by other agencies (e.g. ODFW) to estimate consumption rates and changes in salmon mortality due to predator removal. In 1998 and beyond we will continue to provide technical support and analyses for evaluating the program. Tasks include examining potential feeding compensation by predators in the system following large-scale removals and developing alternate evaluation tools such as the bioenergetics approach. These tools and analyses will provide decision makers with objective data that can be used to focus resources and produce greatest gains.

Columbia Basin Pit-Tag Information System

SPONSOR/CONTRACTOR:
Carter Stein, PSMFC (503/650-5400)

GROUP:
Anadromous Fish

ABSTRACT:
GOAL:

The goal of this project is to operate and maintain the Columbia Basin-wide database for PIT Tagged fish and to operate and maintain the established interrogation systems. The data collected by this system is accessible to all entities.

The measurable goal for the system is to collect 100% valid data and provide that data in "near-real" time with down-time of any system component of not more than one percent as measured during the period pr peak out-migration.

The Passive Integrated Transponder (PIT) tag has been developed as a research and management tool for monitoring the movement of juvenile and adult salmonids in the Columbia River Basin. Fish injected with this tag can be automatically recognized by detecting/recording devices strategically located within collection facilities at hydroelectric dams.

The PIT tag is an electronic tag 10 mm long by 2.1 mm in diameter that can be coded with one of 35 billion unique codes. The tag can be automatically detected and decoded in situ--eliminating the need to sacrifice, anesthetize, handle, or restrain fish during data retrieval.

Laboratory studies with juvenile chinook salmon and steelhead show no adverse effect of the tag on growth or survival. Once the tag is established in the body cavity, its location is found to be consistent over time. Behavioral tests show no significant effect of the tag on opetcular rate, tail beat frequency, stamina, or post fatigue survival in juvenile steelhead. Active swimming does not affect tag retention.

The tag, encapsulated in glass, produces no evidence of infection in tagged fish. However, the PIT tag and tagging apparatus can be disinfected against Aeromonas salmonicida by exposure to a 50% or stronger solution of ethanol for a minimum of one minute.

DATA RETRIEVAL:

When a fish is tagged, all related information about the tagging event and the individual fish is captured and entered into a central database. This information includes its PIT tag number, tagging location, organization responsible for the tagging, species, run, weight, length, wild or hatchery type, marks and general health. Once tagged, the fish is then released into the river system.

As the tagged fish's out-migration occurs, it passes through the electronic interrogation coils established at five permanent sites in the Columbia River Basin. This electronic equipment

automatically detects its PIT tag number, and records its time and location. This information is forwarded to the central database and is permanently coupled with its previous tagging information as the fish makes its way to the Pacific Ocean.

Once the cycle is complete and the tagged adult fish returns to the Columbia River system to spawn the fish is again automatically detected at the permanent interrogation sites as it travels upriver. These data detections are added to the previous information contained in the database about that individual fish and provides additional data of its history and its migration.

HISTORY:

National Marine Fisheries Services (NMFS) and the Bonneville Power Administration (BPA) established a cooperative program in 1983 to evaluate the technical and biological feasibility of the PIT tag. This early effort has now evolved into a major research tool in the Columbia River Basin under the BPA program. Over 2,3 18,000 fish have been tagged and monitored since 1987.

Pacific States Marine Fisheries Commission (PSMFC) has joined with the Columbia Basin Fish and Wildlife Authority (CBFWA) in establishing a steering committee to oversee the technical and policy issues involved with research organizations using the tag within the Columbia River Basin.

Pacific States Marine Fisheries Commission has established a data center in Gladstone, Oregon. This center, the PIT Tag Operations Center (PTGC), houses a management team and the PIT Tag Information System (PTAGIS), a database system. The Center collects, processes and disseminates PIT tag information to interested parties via direct telephone dial-in service.

The PTOC also operates an office in Kennewick, Washington that provides the maintenance support required for operation of interrogation systems at the Columbia and Snake River dams.

To arrange for access to PTAGIS, please contact the Pacific States Marine Fisheries Commission, 45 SE 82nd Drive, Suite 100, Gladstone, Oregon 97027-2522, or call (503) 650-5400

Conforth Ranch - O&M and Enhancements

SPONSOR/CONTRACTOR:
Carl Scheeler, CTUIR (541/278-5268)

GROUP:
Wildlife

ABSTRACT:
The Wanaket Wildlife Mitigation Area, formerly known as the Conforth Ranch, is located near Umatilla Oregon. The approximately 2,800 acre property was acquired by the Bonneville Power Administration (BPA) in June 1993 under the Columbia Basin Wildlife Mitigation Program. The project is a unique example of on-site, in-kind mitigation. The area contains approximately 150 acres of ponds and wetlands, 1,7 16 acres of shrub/steppe, and 780 acres of irrigated pasture. The area has been managed by the Confederated Tribes of-the Umatilla Indian Reservation (CTUIR) since acquisition. Habitat Evaluation Procedures (HEP) resulted in an estimated value of 2,334 combined Habitat Units (HU's) for meadow-lark, quail, mallard, mink, downy woodpecker, yellow warbler, and spotted sandpiper. Cover types included in the HEP are shrub-steppe, pasture, sand/gravel/cobble/mud, emergent wetland, riparian herb, riparian shrub, and riparian tree. With management, a 110% increase in HU's is expected. To ensure that ephemeral wetlands are enhanced and maintained, the irrigation infrastructure was overhauled in 1996/97 Expansion of the wetlands via a water rights transfer is expected in 1997/98. Upland habitats have been improved through fence construction, debris and hazardous materials clean-up, and noxious weed control. A regulated hunt program has been in place since 1993, resulting in over 14,000 hours of recreational/hunter use by more than 3,400 hunters.

9009300

Genetic Analyses of Oncorhyuchus Nerka (ESA)

SPONSOR/CONTRACTOR:
Dr. Ernest Brannon, Univ/ID, subcontractor WSU (20818855830)

GROUP:
Anadromous Fish

ABSTRACT:
Anadromous sockeye salmon (Oncorhynchus nerka) in the Snake River drainage have been listed as endangered. The remaining numbers of these fish migrate over 800 miles upstream to spawn in Redfish Lake, Idaho. The genetic relationships among contrasting life history forms of kokanee, resident sockeye, and anadromous sockeye that share Redfish Lake remain unclear. This has made implementation and interpretation of the Endangered Species Act (ESA) problematic with respect to the anadromous sockeye. To address this question, analysis of mitochondrial restriction fragment length polymorphism (RFLPs) was used to evaluate the maternal lineage of several sympatric and allopatric populations of kokanee and sockeye salmon. Four mitochrondrial gene regionswere examined from 127 1 DNA samples of 0. nerka. Forty composite haplotypes were observed among 37 populations distributed throughout the Pacific Northwest and British Columbia. Twenty of the composite haplotypes observed were attributed to single populations. The phylogeographic patterns of these populations revealed that many are admixtures and probably the result of historical stocking practices. In addition, results indicate genetic differences between kokanee and anadromous sockeye may be evaluated best on a site-by-site basis with respect to populations considered for listing under the Endangered Species Act.

Umatilla Hatchery Satellite Facilities - Planning, Siting, Design, and Construction

SPONSOR/CONTRACTOR:
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

ABSTRACT:
The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) are cooperating in a joint effort to enhance steelhead and reestablish salmon runs in the Umatilla River Basin. As an integral part of this program, Bonifer, Minthorn, Imeques C-mem-ini-kem and Thornhollow satellite facilities are operated for acclimation and release of juvenile salmon and steelhead. Minthom is also used for holding and spawning adult summer steelhead and Three Mile Dam is used for holding and spawning adult coho and fall chinook salmon. The South Fork Walla Walla facility, scheduled for completion in 1997, will be used for holding and spawning adult spring chinook salmon.

Since the facilities began operation in 1983, approximately I .02 million juvenile summer steelhead, 602 thousand coho salmon, 7.4 million fall chinook and 3.3 million spring chinook'sahnon have been acclimated and released. Presently, approximately 3.5 to 4.0 million salmon and steelhead are acclimated annually. This represents approximately 70% of all annual releases into the Umatilla River Basin. A final acclimation/release facility near Pendleton is scheduled for construction in 1998.

All juvenile release groups are representively coded-wire tagged to determine survival and contribution to ocean, Columbia and Umatilla River fisheries and to compare survival differences of acclimated and control (non-acclimated) groups. Results from the acclimation studies are inconclusive.

Summer steelhead have been spawned each year since 1983 and an estimated 3.05 million green eggs have been taken.' Beginning in 199 1, fall chinook and coho salmon broodstock have been collected and spawned in some years. An estimated 1.93 million green fall chinook eggs and 1.62 million green coho eggs have been taken. The eggs are transferred to ODFW hatcheries for incubation, rearing and later release as smolts back into the Umatilla River Basin.

The Umatilla River Basin fisheries restoration plan, of which the Umatilla Hatchery satellite facilities are a key component, has resulted in annual returns of salmon and steelhead to the Umatilla River of 3,300 to 8,000 adults in the last 12 years.

The satellite facilities will continue to be operated in conjunction with the Umatilla Hatchery and used for acclimation of juvenile salmon and steelhead and for holding and spawning of adults. Additional acclimation and spring chinook incubation and rearing facilities are needed to achieve Umatilla River adult return goals. It is hoped that increasing adult returns to the Umtilla River will eventually meet natural production, harvest and broodstock/egg take goals which would make the program self sufficient.

9101901

Hungry Horse Fisheries Mitigation - Confederated Salish and Kootenai Tribes

SPONSOR/CONTRACTOR!
Barry Hansen, Joe DosSantos, Confederated Salish & Kootenai Tribes (406/675-2700)

GROUP:
Resident Fish

ABSTRACT:
Native populations of adfluvial bull (Salvelinus confluentus) and cutthroat trout (Oncorhynchus lewisii) in Flathead Lake used spawning and rearing habitat on the South Fork of the Flathead River that was lost with the construction of Hungry Horse Dam. Operation of the dam brought additional impacts, including reduced reproductive success of Flathead Lake kokanee (Oncorhynchus nerka) spawning in the Flathead River. Loss statements for cutthroat and bull trout, and kokanee were accepted by the Northwest Power Planning Council in 1992. The Confederated Salish and Kootenai Tribes and Montana Fish, Wildlife and Parks jointly implement and monitor a plan to mitigate the impacts of the dam. Mitigation activities include habitat restoration, passage improvement, and hatchery supplementation. Each activity carries its own goal statement. Monitoring must therefore be based on the development of standard methods that are used to establish baselines and that can be duplicated for detection for future trends. Habitat restoration and passage improvements are being implemented throughout the basin. Direct supplementation is presently limited to kokanee, which are being released under the terms of a five year test. Estimates of the baseline level of angler harvest, pressure and species composition of the catcher were collected in 1992 and 1993, using a stratified random survey with roving clerks. Duplication of the survey is planned for 1998. Monitoring of native cutthroat and bull trout is accomplished with annual gillnet surveys and redd counts. Methods established in 1982, prior to mitigation, that standardize timing, location, depth, and number of gillnets, serves as the technique for detecting population trends. 'Intensive monitoring of kokanee releases into Flathead Lake have occurred annually and have consisted of efforts to quantify mortality, growth, angler harvest, and escapement. Population changes in Flathead Lake coincident with the onset of mitigation activities have complicated the analysis of the results of mitigation. Adaptive management has been necessary to direct and tailor mitigation activities to accommodate the changing ecology of Flathead Lake.

‘Hungry Horse Mitigation/Habitat Improvements

SPONSOR/CONTRACTOR:
Brian Marotz, MDFWP (406/75 l-4546)

GROUP:
Resident Fish

ABSTRACT:
This portion of the Hungry Horse Mitigation Program focuses on restoration of native bull trout (Salvelinus confluentus) and westslope cutthroat trout (Oncorhynchus clarki lewisi) populations through enhancement of stream habitat and fish passage. Offsite lake rehabilitations and monitoring are also major components of the project. In this presentation, I will discuss several completed and ongoing projects including: installation of a step-pool fish ladder, riparian enhancement, stream channel manipulation, road slump stabilization, construction of trout spawning channels, treatment of small lakes with rotenone, and culvert replacements. Preliminary results and monitoring strategies till be presented.

9101904

Hungry Horse Mitigation - Creston Fish Recovery

SPONSOR/CONTRACTOR:
Wade Fredenberg/Mark Maskill, USFWS (406/758-6872)

GROUP:
Resident Fish

ABSTRACT:
In 1991, Montana Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribes wrote a mitigation plan to offset losses of kokanee salmon in Flathead Lake attributed to the construction and operation of Hungry Horse Dam. A single element of the mitigation goal was to "Replace lost annual production of 100,000 adult kokanee, initially through hatchery production and pen rearing in Flathead Lake, and partially replace lost forage for lake trout in Flathead Lake." An implementation plan was completed and adopted by the NPPC in 1993. This plan specified fishery activities to protect and enhance fishes and aquatic habitats affected by the operation of Hungry Horse Dam. One mitigation activity specified in the implementation plan is a 5-year program to reintroduce kokanee to Flathead Lake. Under the program stocking of kokanee reared at Creston National Fish Hatchery began in 1994 and will operate through 1998. The annual stocking objective was set at 1 .O million yearling kokanee, however the objective can be modified based on production capabilities and adaptive management recommendations from the Technical Team. The 5-year "kokanee test" began in June 1994 with the release of 802,000 yearling kokanee. In June 1995, 502,000 yearling and 409,000 fingerling kokanee were stocked. In April 1996, 939,000 yearling and 790,000 kokanee fry were stocked. In August, 220,000 kokanee fingerlings were also stocked.

To date, a number of operational constraints have prevented stocking objectives to be met. Monitoring results from June 1993 through the fall of 1995 has indicted that survival of stocked kokanee was less than levels set as targets in the implementation guidelines. Poor survival of stocked kokanee has been primarily due to predation by lake trout. A documented success and fish cultural breakthrough has been the establishment of a captive brood stock at Creston National Fish Hatchery. A secure egg source for adaptive management strategies is now in place.

Monitoring the Smolt Migrations of Wild Snake River Spring/Summer Chinook Salmon

SPONSOR/CONTRACTOR:
Gene Matthews, Steve Acord, NMFS (206/860-325 1)

GROUP:
Anadromous Fish

ABSTRACT:
Before the late 198Os, information on the migrational characteristics of Snake River spring/summer chinook salmon smolts Oncorhynchus tshawytscha from individual wild populations was scarce. During summers 1988 through 1996, we PIT tagged wild parr in a number of natal streams; however, due to the recent severely depressed status of Snake River Basin fish, we limited tagging to small numbers of fish in only three streams in 1995 and 1996. Each spring following the summer marking, tagged smolts were detected as they passed through juvenile bypass systems at dams on the lower Snake and Columbia Rivers. For the period, collection and marking mortality averaged 1.4%. Overall detections of smolts at the collector dams averaged 10.8% of the releases during the period. In all years, smolts from smaller parr (55-60 mm size range) were detected the following springs at significantly lower rates than smolts from larger parr (65-85 mm size range). Smaller parr also migrated significantly later as smolts than larger parr.

At Lower Granite Dam, annual migrational timings were consistently protracted and were highly variable among streams and years. In addition, we observed 2-week migrational timing shifts between relatively warm and cold years. Over all years, peak detections coincided with higher flows after, but not before, 9 May. This trend suggests that reserved water will provide more benefit to wild smolts if it is utilized after the first week of May, particularly during low flow years.

Annual climatic variation is emerging as an important factor controlling the overall migrational timings of wild smolts at Lower Granite Dam. We recommend the continued annual PIT tagging of wild parr to examine their migrational behaviors as smolts and to provide information for in-season management decisions. Further, the monitoring of environmental variables should continue to examine how they influence smolt migrational timing.

9102900

Life History of Fall Chin in Co1 River Basin

SPONSOR/CONTRACTOR:
Dennis Rondorf, National Biological Service (509/538-2299)

GROUP:
Anadromous Fish

ABSTRACT:
This study was initiated in 1991 to identify physical and biological factors which influence spawning of fall chinook salmon in the free-flowing Snake River and their rearing and seaward migration through Snake and Columbia river reservoirs. To date, our results constitute much of the contemporary knowledge of fall chinook salmon in the Snake River. Study results include documentation of spawn timing, redd numbers and distribution, habitat requirements; and the extent of deep-water spawning. Spawning data has been instrumental in providing minimum spawning and egg incubation flows from Hells Canyon Dam and for determining the location of acclimation facilities for supplementation. Our juvenile fall chinook salmon PIT tagging work has furnished fishery managers with information on emergence timing, rearing distribution and habitat requirements. Run timing is provided annually to fishery managers for in-season flow management decisions. Our cooperative analyses with WDFW provided the genetic information on the natural stock which helped finalize the decision to use Lyons Ferry Hatchery stock for supplementation upstream of Lower Granite Dam.

In 1995, we used our findings on the natural life history of Snake River fall chinook salmon to develop an approach to evaluate supplementation of hatchery fish using naturally produced fish as a model. Natural fall chinook salmon which emerge, grow to smolt size, and migrate seaward earlier may have a survival advantages over later maturing and migrating fish. Given the'above preliminary findings, we undertook a coordinated effort with the National Marine Fisheries Service (NMFS) and the Nez Perce Tribe (NPT) studying supplementation strategies. Hatchery fall- chinook released in the wild at larger sizes survived at the highest rates. Survival of hatchery fish decreased as release dates became later. The above two preliminary results appear to be consistent between hatchery and natural fall chinook salmon and maybe key to maximizing the recovery benefits of supplementation upstream of Lower Granite Dam.

The primary benefit of supplementation will be an increase in naturally produced fry. The recovery benefits of these naturally produced fry will not be fully realized unless the limiting factors which led to ESA listing are identified and remedied. Part of our supplementation research involves investigating the mechanisms underlying juvenile salmon survival and the interactions between hatchery and wild fish. We are collaborating with NMFS and NPT to study survival through the lower Snake River dams. Growth of hatchery and wild salmon and predation on juvenile salmon by smallmouth bass in the Hells Canyon Reach are being examined to weigh predation risk versus growth advantage, and to determine if selective predatiqn is taking place. Radio telemetry has and is being used to describe the migratory behavior of juvenile fall chinook salmon through a lower Snake River reservoir to more precisely determine travel rates, migratory behavior, and where migrational delays are occurring. Both hatchery and wild fish will be released in 1997 to evaluate the effects of a summer spill test at Little Goose Dam.

Spokane Tribal (Galbr Sprgs) Hatchery - O&M

SPONSOR/CONTRACTOR:
Tim Peone, Hatchery Manager, Spokane Tribe (509/258-7297)

GROUP:
Resident Fish

ABSTRACT:
The Spokane Tribal Hatchery serves as partial mitigation for the extinction of anadromous fishes in the upper Columbia River due to the developement of the Federally owned and regulated Grand Coulee Dam. This project, which included the construction and foregoing operation and maintenance cost, is authorized by the Northwest Power Planning Councils 1987 Columbia Basin Fish and Wildlife Program. Hatchery production goals are determined by a technical team consisting of fishery managers from the Spokane Tribe, Colville Confederated Tribes and Washington Department of Fish & Wildlife. The 1997 production goal is 388,000 kokanee yearlings, 960,000 kokanee fingerlings and 530,000 rainbow trout fingerlings. Spokane Tribal Hatchery produced are released in Lake Roosevelt and Banks Lake. The project operates in conjunction with the Sherman Creek Hatchery and Lake Roosevelt Rainbow Trout Net Pen Project.

9104700

Sherman Creek Hatchery - O&M

SPONSOR/CONTRACTOR:
Mike Albert, WDPW (509/625-5 169)

GROUP:
Resident Fish

ABSTRACT:
Sherman Creek Hatchery is located immediately adjacent to Lake Roosevelt at-the mouth of Sherman Creek, three miles west of Kettle Falls, Washington. The operations and maintenance are performed by the Washington Departmentof Fish and Wildlife (WDFW) with funding provided by the Bonneville Power Administration (BPA). The hatchery is one of two kokanee (Gncorhynchus nerka) facilities provided to partially mitigate for loss of anadromous fish habitat due to the construction of Grand Coulee Dam in 194 1. The hatcheries were initiated in part by the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program. The BPA, Spokane Indian Tribe, Colville Confederated Tribes, Upper Columbia United Tribes Fisheries Research Center, National Park Service, and the WDFW work conjunctively towards the goal of fishery enhancement on Lake Roosevelt and Banks Lake. The combined production goals of the Sherman Creek Hatchery and the Spokane Tribal Hatchery were initially established at 13 million young of the year age kokanee (8 million for Lake Roosevelt and another 5 million for Banks Lake). In addition to the kokanee, 500,000 yearling rainbow trout (Oncorhynchus mykiss) were to be supplied annually for net pen raring with much of the labor from the Lake Roosevelt Development Association and other volunteer groups operating on Lake Roosevelt.

The role of the Sherman Creek Hatchery in this program is to (a) establish a kokanee broodstock for future egg requirements; (b) create and enhance the kokanee fishery within Lake Roosevelt; and (c) assist in rainbow trout rearing for the net pen operations on Lake Roosevelt.

Sherman Creek Hatchery was designed to rear 1.7 million kokanee fry for acclimation and imprinting during the spring, and to trap all available adults during the fall for collection and spawning operations. Since the start of the Lake Roosevelt project the operating plans have been-modified to better achieve program goals. These changes in strategies have been the result of recommendations through the Lake Roosevelt Hatchery Coordination Team and were implemented as the result of the monitoring and evaluation program associated with the production facilities. The program changes are primarily to enhance imprinting, improve survival, and operate the two kokanee facilities more effectively.

Supplementation Fish Quality (Yakima)

SPONSOR/CONTRACTOR:
Tom Flagg, NMFS (206/842-7 181)

GROUP:
Anadromous Fish

ABSTRACT:
NATURES research focuses on developing salmon culture techniques to produce fish with more wild-like behavior and morphology and higher postrelease survival compared to conventionally-reared salmon. Culture techniques currently being researched include rearing fish in seminatural habitats that promote the development of proper camouflage coloration, training fish to avoid predators, exercising fish to enhance their ability to escape from predators, and supplementing their diets with live foods to improve their foraging ability. The NATURES program has tested the effect of seminatural culture habitat on chinook salmon postrelease survival in three experiments. In the first experiment, fall chinook salmon were reared from the fiy to smolt stage (4 months) in 400-l raceways with sand or gravel substrates, plastic aquarium plant structure, and opaque overhead cover. When released into a Hood Canal watershed stream, these seminaturally-reared fish had a 5 1% higher survival through a 2.2 km migration corridor than conventionally-reared salmon. In the second experiment, spring chinook salmon were reared in similar 400-l seminaturalraceway habitats for the last 4 months of their freshwater cycle. When challenged to survive a 225 km migration down the Yakima River under clear water conditions, these seminaturally-reared spring chinook salmon had a 24% higher survival than conventionally-reared spring chinook salmon. This survival advantage was lost when seminaturally-reared spring chinook salmon were released into the Yakima River under turbid water conditions that make it difficult for predators to visually detect prey. In the third experiment, rearing vessel size was increased to 5,947 liters to determine if fish could be successfully reared in seminatural habitat at production scale. In this experiment, fall chinook salmon were reared from swimup to smoltitication (a 3 month period) in seminatural raceway habitats with pea gravel substrate, sheared fir tree structure, camouflage net cover, and automated underwater feeders. When challenged to survive a 21 km migration down Bingham Creek, seminaturally-reared fish had a 27% higher postrelease survival than salmon reared in identical size conventional barren grey raceways. In all three experiments, fish reared in seminatural culture habitats developed coloration that more closely matched stream background coloration than conventionally-reared salmon. We believe the postrelease survival of fish reared in seminatural habitats was enhanced by better camouflage coloration, reducing their vulnerability to visually hunting predators. We conclude that rearing fish in seminatural habitat is an effective culture technique for increasing postrelease survival and should be used in both fisheries enhancement and conservation hatcheries.

(Additional abstract from project 9506405, "Comparing the Post-release Survival of Fall Chinook Salmon Reared in NATURES Environments")

Previous studies have shown that the post-release survival of cultured fall chinook can be improved when the fish are reared in raceways containing gravel substrates, intra-gravel filtration, underwater feeders, in-water structure, and overhead cover. Our objectives were to ascertain whether similar gains in survival could be achieved by using only a few of these components or by reducing the length of time the fish were cultured in a 'NATURES' environment (the 'LNIT' or 'Limited New Innovative

Strategy'). We evaluated the effects of 7 different rearing treatments on the in-culture performance and post-release survival of fall chinook. In the control or OCT ('Optimal Conventional Treatment') case the fish were fed by hand from the surface and nothing was added to the 2 m circular tanks we used as rearing vessels. The remaining 6 treatments all had 90% of their surface area covered with camouflage netting. In one treatment this was the only added feature. An additional single element, either an underwater feeder, a filter that was covered with a mono layer of pea gravel, or two submerged panels of camouflage netting, was added to three of the other rearing environments. The remaining two treatments possessed covers,' underwater feeders, intra gravel filters, and in-water structure, however, fish were cultured in these conditions for varying periods. Those experiencing a full NIT or NATURES treatment were held throughout their entire 92 - 105 day rearing-period. Fish exposed to the LNIT treatment, on the other hand, were reared under OCT conditions and then exposed to a NIT regime during the last 30 days of their rearing periods. Four replicates of each rearing treatment were cultured and all the fish possessed thermal codes in their otoliths that could be used to identify which tank they had originated from. None of the rearing treatments appeared to effect the growth of the fish as they had similar lengths and weights at the end of the rearing period. Differences did occur in their in-culture survival. Fish reared in tanks without substrates or in-water structure (the OCTs, Cover + underwater feeder, and Cover regimes) had mortality rates that were less than 1 %, fish held in tanks with in-water structure experienced a slightly higher mortality (1.5%) while the populations in the NIT, LNIT, and Cover-substrate tanks had the highest mortality (4 - 6 %) rates. The rearing environments also affected the color patterns of the fish. Individuals from the NIT and LNIT tanks had pronounced parr marks, colored tins, and heavy melanic spotting and thus appeared to be more cryptic than fish produced from the other rearing treatments. The post-release survival of fish originating from each treatment was evaluated by making two separate releases into Bingham Creek and allowing the fish to migrate 2 1 km before being recaptured. Two replicates of each rearing treatment were liberated during a release. Altogether 28,000 fish were liberated and 10,000 were recovered. To date 6,000 recaptured fish have had their otoliths decoded. Chi-square tests performed on some of the recovery data indicated that fish reared in NIT environments, tanks with in-water structure, and those with intra gravel filters had the best survival, the lowest surviving groups came from the rearing treatments that only possessed a cover. Our efforts to develop an operational NIT will continue in 1997 and will concentrate on how various substrates and cover configurations effect in-culture performance and post-release survival.

Yakima Phase 2 Screen Fabrication

SPONSOR/CONTRACTOR:
John Easterbrooks, WDFW (509/575-2734)

GROUP:
Anadromous Fish

ABSTRACT:
WDFW's Yakima Screen Shop (YSS) has been the headquarters for the WA state fish screening program since 1946. The YSS is a production metal fabrication shop with the capability to build nearly anything out of mild steel, stainless steel or aluminum. Since 1985, the YSS has been Bonneville Power Administration's (BPA) primary supplier of fish screens and miscellaneous metalwork (e.g. lifting gantries, control gates, etc.) for Yakima Basin fish screen projects constructed under the Council's Fish and Wildlife Program (FWP). Since FY92, YSS has fabricated and installed screens and misc. metalwork for 22 Phase 2 (P2) projects on gravity water diversions ranging in size from 2 to 150 cubic feet/second. YSS has treated six additional P2 sites performing "decommissioning" tasks for diversions that are being abandoned or converted to reduced flow pump diversions pursuant to the Yakima Basin general water rights adjudication. BPA funding in FY96 and FY97 was $300K and $2 14K, respectively.

9106000

Kalispel - Pend Oreille Wetlands

SPONSOR/CONTRACTOR:
Ray Entz, Wildlife Biologist, Kalispel Tribe of Indians (509/445-1147)

GROUP:
Wildlife

ABSTRACT:
Initially scoped in 1987 by the Albeni Falls interagency work group under the Northwest Power Planning Council's wildlife rule, this project was ranked through the IPP process and considered for funding as a lost opportunity project in 1989. The Kalispel Tribe of Indians' Pend Oreille Wetlands Wildlife Mitigation project (a 440-acre floodplain ranch) was purchased in December of 1992. Beginning in May of 1993, the project is managed to benefit seven priority target species for losses associated with the construction of Albeni Falls Dam. The species used as indicators for habitat cover type enhancement are Bald Eagle (breeding and wintering), Black-capped Chickadee, Yellow Warbler, Mallard, Canada goose, muskrat, and white-tailed deer. The project site is located in northeastern Washington along the Pend Oreille River and adjacent to the northern boundary of the Reservation.

Originally assessed for a potential of 1,260 H.U.'s to be credited to BPA, the project provides at a minimum, 360 protected H.U.'s and at least 617 H.U.'s to be credited through enhancements. This project includes seven distinct habitat types with at least one target species associated with each. Habitat types include black cottonwood riparian forest, emergent sedge wetlands, emergent marsh wetlands, open water wetlands, scrub-shrub wetlands, mixed coniferous upland forest and floodplain meadow. Enhancement funding will continue through 2002 to complete riparian restoration/reforestation, wetlands enhancements, pasture enhancements, upland mixed coniferous forest management, scrub-shrub wetland restoration, and ongoing monitoring, evaluation, operations and maintenance. All management activities are consistent with and complimentary to the goals and objectives in the Kalispel Natural Resource Department's Fish and Wildlife Management Plan.

Idaho Water Rental - Resident F&W Impacts - Phase III

SPONSOR/CONTRACTOR:
Eric Leitzinger, IDFG (208/334-3 180)

GROW:
Resident Fish .

ABSTRACT:
Phase I of the Idaho Water Rental Project was implemented in 1991 as part of the Non-Treaty Storage Fish and Wildlife Agreement between the Bonneville Power Administration and the Columbia Basin Fish and Wildlife Authority. Phase I was completed in 1992. The primary purpose of phase I was to summarize existing resource information and provide recommendations to protect or enhance resident fish and wildlife in the Snake River Basin upstream of Brownlee Reservoir resulting from water released for salmon flow augmentation.

Phase II began in 1993. It focused on a biological appraisal of resident fish and wildlife habitat in the Snake River between American Falls Reservoir and the city of Blackfoot. Phase II also included biological, legal, and political developments since the completion of phase I and a summary of the 1,993-94 flow augmentation releases out of the upper Snake, Boise, and Payette river systems. Phase II was completed in' 1994.

Phase III began in 1995 with the overall goal of quantifying changes in resident fish habitat in the Snake River basin upstream of Brownlee Reservoir resulting from the release of salmon flow augmentation water. Existing data, in the form of weighted usable area versus flow relationships, were used to estimate habitat changes for white sturgeon (Acipenser transmontanus) and rainbow trout (Oncorhynchus mykiss)in the Snake River between C.J. Strike Dam and Brownlee pool. The increased flows resulted in increased white sturgeon habitat for most life stages. Rainbow trout adult and spawning habitat increased while juvenile and fry habitat generally decreased. Whether or not these short term increases in habitat result in long term benefits to the fish populations has yet to be determined. Phase III is ongoing and will continue to monitor and evaluate the impacts of the salmon flow augmentation releases on resident fish and wildlife in the upper Snake River Basin and refine earlier recommendations.

Snake River Sockeye Salmon Habitat

SPONSOR/CONTRACTOR:
Doug Taki, Shoshone-Bannock Tribes (208/238-3914)

GROUP:
Anadromous Fish

ABSTRACT:
This project evaluates the limnological attributes, and fish population dynamics of historic Snake River sockeye salmon nursery lakes in the Sawtooth Valley, Idaho. Based on our research we are able to estimate carrying capacities of these systems in order to recommend stocking numbers for each lake as fish become available from the captive broodstock program. Without this data high stockingdensities could result in a zooplankton crash which would reduce available habitat for sockeye for future years and impede recovery. This program is a component of Snake River sockeye recovery, an inter agency effort with an exemplary record of mutual cooperation between Tribal, State, and Federal agencies.

To increase rearing habitats in historical areas we have removed one fish passage barrier and are in the process of constructing weirs on the outlets of Pettit and Alturas lakes that will allow us to evaluate pre-smolt survival and smolt outmigration. We also initiated a lake nutrient enhancement project in Redfish Lake in 1995. Based on our rearing capacity estimates we will also add nutrients to Pettit and Alturas lakes starting in 1997. Conservative estimates for rearing capacities range between 5.53 and 10.05 kg/ha, 7.03 to 16.54 kg/ha, and 6.03 to 10.53 kg/ha for Redfish, Pettit, and Alturas lakes, respectively. This nutrient enhancement is considered relatively short term to increase the survival of juvenile fish stocked in each lake.

We use hydroacoustic sampling to estimate 0. nerka densities and biomass. During 1996 we only did hydroacoustic sampling on Redfish, Pettit, and Alturas lakes. Hydroacoustic estimates of 0. nerka densities in 1996 ranged from 61 to 480 fish/hectare; and biomass ranged from 0.97 in Alturas Lake to 15-20 kg/ha in Pettit Lake. Density was greatest in Pettit Lake followed by Redflsh and Alturas lakes.

In 1995, in addition to our regular fish community sampling, we began monthly sampling of hatchery rainbow trout in Pettit Lake to evaluate competition and predation interactions between hatchery rainbow trout and 0. nerka. Data from those samples indicates that there is very little diet overlap and predation was only found during one sample period, the week after release of broodstock sockeye. Those fish were released in the littoral zone. Future releases will be made in the pelagia in all lakes.

Close monitoring of nursery lakes is necessary to evaluate potential changes in the aquatic community as the result of sockeye introductions. This information is critical to help make future management. decisions.

Redfish Lake Sockeye Salmon Captive

SPONSOR/CONTRACTOR:
Steve Huffaker/Al Van Vooren, IDFG (208/334-3791)

GROUP:
Anadromous Fish

ABSTRACT:
Numbers of Snake River sockeye salmon Oncorhynchus nerka have declined dramatically in recent years. Currently in Idaho, only Redfish Lake in the Stanley Basin supports a remnant anadromous run. In December 1991, the National Marine Fisheries Service listed Snake River sockeye salmon as Endangered under the U.S. Endangered Species Act. In that same year, the Idaho Department of Fish and Game and the National Marine Fisheries Service initiated a captive broodstock -program to aid in the recovery of these fish. Efforts focus on protecting and rebuilding the Redfish Lake stock. Since 199 1, all 15 returning anadromous adults, several residual sockeye salmon, and approximately 900 out-migrating smolts have been taken into the program to produce captive broodstocks. Supplementation strategies for returning hatchery-produced sockeye salmon to Stanley Basin waters include: adult releases, pre-smolt releases, smolt releases, and eyed-egg plants to in-lake incubators. Since 1993, over 200 adults, 100,000 pre-smolts, 15,000 smolts, and 100,000 eyed-eggs have been supplemented to Stanley Basin-waters. In 1997, an estimated 300,000 broodstock progeny will be available for supplementation. Redfish Lake pre-smolt releases include both net pen and direct-to-lake strategies. In 1995, pre-smolt releases were expanded to include Pettit Lake. In 1997, plans are in place to incorporate a third rearing lake. Lake outmigration and survival to maintstem Snake and Columbia River dams is estimated by broodstock lineage and release strategy. To date, Stanley Basin smolt outmigration from program releases stands in excess of 30,000 fish. In outmigration year 1996 alone, approximately 16,000 hatchery-produced smolts outmigrated successfully past Lower Granite dam. Hatchery-produced adult sockeye salmon could begin returning to Redfish Lake as early as 1997. Performance evaluations, by broodstock lineage and release strategy, now guide the development of rearing and release plans. By taking these actions, we have successfully postponed species extinction and started the process of rebuilding Snake River sockeye salmon populations in the Stanley Basin.

9107300

Idaho Natural Prod. Monitoring/Eva1 83-7 (ESA)

SPONSOR/CONTRACTOR:
Al Van Vooren, IDFG (208/334-3791)

GROUP:
Anadromous Fish

ABSTRACT:
This project began in 1984 and has the following objects: 1) document status and trends of wild/natural chinook and steelhead populations in Idaho; 2) update and maintain statewide parr density database; 3) determine the mathematical relationship between spawning esacapement, parr production, and smolt production; 4) develop models to predict the number of wild/natural smolts that will arrive at Lower Granite Dam; and 5) estimate Snake River Basin-wide smolt-to-adult return rates.

This project has deveoped good information on the relationship between chinook salmon adult escapement and smolt production. For steelhead trout, we have developed a good relationship between parr population and smolt production and estimated carrying capacity.

This project has reported the following results:
1. What proportion of sand or finer material in spawning areas results in reducted chinook egg-to-parr survival.
2. In streams degraded by dredge mining, parr carrying capacity can be increased for chinook by connecting off-channel ponds to the stream, and for steelhead by adding complex instream structures.
3. Survival of wild/natural chinook parr PIT-tagged in August and returned ot their natural rearing habitat is not significantly different than their un-handled cohorts over a two-month period.
4. For chinook and steelhead parr PIT-tagged in August, there is no significant difference in survival to smolts whether they were collected with a beach seine or a backpack electroshocker.
5. Arrival time at Lower Granite Dam of wild/natural chinook smolts occurs over a much longer time frame than the more numerous hatchery smolts.
6. Anglers can have a significant impact on wild/natural steelhead smolt production in streams with high anger use, no gear restrictions, and six fish limit.

Yakima Phase II Screens - Construction

SPONSOR/CONTRACTOR:
Dennis Hudson, US BOR (208/378-5250)

GROUP:
Anadromous Fish

ABSTRACT:
The Yakima Phase II fish passage program is an extension of the Phase I program that corrected fish passage conditions at about 16 major diversions in the Yakima River Basin. Over 60 medium and smaller size diversions were originally included in the Phase II program. Fish screens at 22 Phase II diversion sites have been modified or rebuilt by Reclamation since first construction was started in fiscal year 1992. Most of these sites have been funded by Bonneville Power Administration. The Wapatox screens were funded and built by Pacific Power & Light Co. And the Yakima-Tieton screens presently under construction are funded by Reclamation. In addition, the Washington Department of Fish and Wildlife Yakima Screen Shop has modified or replaced 8 or 10 smaller Phase II screens and about 10 sites have been eliminated from the program due to changed agricultural practices and apparent abandonment.

Program accomplishments have been affected by funding limitations, difftculties in securing rights-of-way, changed site conditions, difficulties in negotiating plans that are acceptable to irrigators, regulatory and management agencies, unresolved water rights issues, proposed consolidation projects, environmental concerns, legal issues, etc. The Technical Work Group, composed of federal, state and local agencies, Yakima Indian Nation, irrigation entities and others has worked by consensus to develop innovative solutions to these complex issues.

Reclamation currently has seven sites under construction that will be completed before the start of the irrigation season this spring. Four other sites are in the planning and design stage and should be built and operational a year from now. About ten more sites will be completed by Reclamation by the year 2000 with modifications and revisions to a few selected sites being completed in 2001. Another 5 or 6 sites will be screened by the Washington Department of Fish and Wildlife screen shop to complete the Phase II program.

9107800

Burlington Bottoms Wildlife Mitigation Project

SPONSOR/CONTRACTOR;
Joe Pesek, ODFW (503/657-2000)

GROUP:
Wildlife

ABSTRACT:
Conduct operations and maintenance for Burlington Bottoms Wildlife tract; continue maintenance and enhancement activities for wildlife habitat as necessary, in order to meet the goals and objectives of the management plan. Opportunities for cooperation include the use of volunteers from various local groups such as The Nature Conservancy, Portland Audubon Society, etc., to assist with maintenance and enhancement activities on the site. This site was purchased in 1991 by BPA as mitigation for habitat lost along the Columbia and Willamette Rivers, and as such was one of the first sites in Oregon under the Northwest Power Planning Council Agreement. No cost shares have been received from other agencies for this project. In 1993, a Habitat Evaluation Procedure (HEP) was conducted to analyze and assign a value to the existing habitat at Burlington Bottoms. Results of the HEP were used to design management activities related to the maintenance and enhancement of the wildlife habitat. Surveys to gather baseline data for fish, wildlife, and plant populations were conducted in 1993, 1994, and 1995.1) Burlington Bottoms Habitat Evaluation; 2) Results of 1995 and 1996 Neotropical Migratory Landbird Surveys at Burlington Bottoms; and 3) Burlington Bottoms Annual Reports 1995 & 1996. The Burlington Bottoms project site provides habitat for many species of fish and wildlife, and is a remnant of a once more prevalent wetland habitat along the lower Columbia and Willamette Rivers. Past human disturbances and the invasion of exotic non-native plant and animal species require maintenance and enhancement activities to control and/or eliminate no&native plant species and restore native plant populations, in order to improve both the quality and quantity of fish and wildlife habitat.

Yakima Screens - Phase II - 0 & M

SPONSOR/CONTRACTOR:
John Easterbrooks, WDFW (509/575-2734)

GROUP:
Anadromous Fish

ABSTRACT:
In FY93, WDFW's Yakima Screen Shop (YSS) began performing O&M on BPA-funded Yakima Basin Phase 2 fish screen facilities. In FY96, YSS provided preventive maintenance services on 12 Phase 2 sites with $77K of BPA funding. These facilities range in size from a 2' dia. x 4' long paddlewheel-driven, modular screen (2 cfs) up to a 150 cfs canal with 8 - 6.5' dia. x 10' electric-drive drum screens. YSS performs major, post-construction modification work to improve facility performance after intial operation begins. YSS also provides preventative maintenance services to protect BPA's investment and prolong useful life of the fish screen facility. Tasks include: lubrication, vegetation control, bypass cleaning, preseason screen installation and post-season annual inspection/winterization. The waterusers are responsible for routine maintenance such as raking debris from trashracks, adjusting fish bypass flow and monitoring for malfunctions or vandalism. Wateruser O&M costs in excess of a negotiated "deductible" equal to their pre-Phase 2 annual screen O&M costs, are eligible for reimbursement by BPA if properly documented and verified by YSS.

9201000

Habitat Restoration/Enhancement Fort Hall Bottoms

SPONSOR/CONTRACTOR:
David Arthaud, Shoshone-Bannock Tribes (208/238-3761)

GROUP:
Resident Fish

ABSTRACT:
In 1992 a comprehensive project was initiated on the Fort Hall Bottoms to address habitat degradation and declining numbers/hybridization of native cutthroat trout. Palisades and American Falls reservoirs and the main stem Snake River are rapidly flooded and drafted each year. This directly and indirectly causes massive streambank erosion on bottoms spring streams; severely reducing spawning substrate, water quality, and populations of stream-dwelling invertebrates. Key to the project is implementation of low tech enhancement/restoration techniques, including; bank sloping, instream structures (e.g. wing dams and barbs), evergreen revetments, riparian revegetation, and fencing. These techniques aggrade sediment, increase flow velocity, narrow and deepen stream channels, clean spawning gravels, provide cover for adult and juvenile trout, and protect streambanks from erosion. Each facet of the project addresses habitat requirements of each life stage of salmonid fishes. Project success is quantified through measurement of abiotic (stream morphology, sediment levels, and water chemistry) and biotic variables (fish densities, fish biomass, and invertebrate community indices). Adult fish numbers pre-project were between 5-20 trout/hectare (50 kg/hectare), current-project numbers have reached 100 trout/hectare (100 kg/hectare). Fish size has increased considerably since project inception; prior to enhancement/restoration and regulation changes (catch and release for permit holders) 20 % of electrofishing catch was greater than 508 mm in total length. Since implementation 3 1 % of catch is greater than 508 mm in total length. Fry densities have increased to 0.85 fry/lm of evergreen revetment versus control densities which approach 0.04 fry/lm of shoreline. Natural production reached high enough levels to eliminate stocking of hatchery fish in 1994. However, hybridization of cutthroat with introduced rainbow trout is a continued problem on bottoms and mountain streams. Re-introduction of native cutthroat trout is planned for Fort Hall bottoms and mountain streams through implementation of the Fort Hall resident fish hatchery program. Continued efforts with restoration/enhancement and re-introduction of native species along with stable funding will continue to slow adverse impacts and increase native trout populations.

Wild Smolt Behavior/Physiology (ESA)

SPONSOR/CONTRACTOR:
Walt Dickoff, NMFS (206/860-3234)

G R O U P :
Anadromous Fish

ABSTRACT:
The primary goal of this research is to improve smolt quality of juvenile salmon released from public hatcheries. Good smolt quality is defined as the physiological/behavioral condition of juvenile salmon that results in rapid downstream migration, growth in the ocean and high survival to adulthood. Producing high quality smolts with greater smolt-to-adult survival will allow equivalent hatchery contribution to adult harvest with fewer smolts released. Producing high quality smolts that migrate downstream rapidly will reduce opportunities for hatchery-wild fish interactions and minimize negative impacts of hatchery fish on wild fish. Rapidly migrating smolts will be less likely to residualize and imprint on inappropriate stream sites, and therefore be less likely to stray during their homing migration; thus, reducing the likelihood of introgression of hatchery fish on wild fish gene pools.

Our earlier BPA-sponsored research (Project 89-046) examined the smolt quality of spring chinook salmon reared at Columbia River hatcheries. We found significant differences in smolt physiology between hatcheries, and these differences were correlated with smolt-to-adult'survival. Hatcheries that produced high quality smolts had high adult survival. Most significantly in the hatchery study, we found that high growth rate of fish for several months immediately before release correlated with high survival to adults. Thus, these findings strengthen our initial conclusion that high growth rate during smolting improves smolt-to-adult survival (Dickhoff et al., 1995; Am. Fish. Soc. Symp. 15:292). This finding suggests that hatcheries might improve post-release survival of smolts by maintaining high growth rates for 5-6 weeks before release.

The initial objective of our current project was to characterize the physiology and development of naturally reared, wild chinook salmon juveniles. The rationale for this study is that the physiology of naturally-produced smolts could be used as a template for rearing high quality smolts in hatcheries. The basis for our rationale is that wild fish show greater smelt-to-adult survival than hatchery fish. We found that growth and smolt development in wild spring chinook salmon is highly seasonal and more dynamic than that found in hatcheries. Wild fish do not grow in fall and winter, but show rapid growth and metabolic changes coincident with smolting in spring. Furthermore, naturally reared smolts are smaller and leaner than their hatchery counterparts. Rapid growth rate during smolting is a common attribute of both high quality hatchery and wild fish. Since we found a correlation between growth rate and smolt quality, we tested for causality of this relationship. Furthermore, we needed to test whether smolt size or growth rate had a greater influence on smolting. Groups of large and small chinook salmon were grown at fast or slow growth rates, and then tested for downstream migratory behavior. We found that faster growing fish migrated in greater proportion than slow-growing fish regardless of body size. This suggests that high spring growth rate is more important than body size for producing good quality smolts.

Currently our objectives are to 1) test the effects of growth rate manipulation on smolt-to-adult survival on a production scale within the Columbia River Basin, and 2) determine which of the physiological

attributes of wild fish may be important to mimic in the rearing of hatchery fish, and 3) examine the basic biological mechanisms regulating growth, development and metabolism ofjuvenile salmonids, so that our applied studies are based on a fundamental understanding of regulatory processes. For objective 1, we are collaborating with the Fishery Project of the Clatsop County Economic Development Council. Growth rates of spring chinook salmon are adjusted to minimize growth in the winter and enhance growth in the spring. For objective 2, we are manipu- lating growth rates by controlling temperature and feeding to simulate growth rates of fish in the wild and hatchery. Effects of these treatments on smolt physiology will be examined. For our third objective we are studying the endocrine control of growth, metabolism and smolting. We hypothesize that high body fat levels of hatchery reared fish contribute to insulin-resistance comparable to obesity-related diabetes in mammals. Feeding fish in winter before smolting may be maladaptive; suppressing spring growth and production ‘of high quality smolts.

Columbia Basin Law Enforcement Program

SPONSOR/CONTRACTOR:
Pete Nylander, Senior Resident Agent, USFWS (503/682-613 1)

GROUP:
Anadromous Fish

ABSTRACT:
In a very much people-impacted world, the species management prescriptions outlined by good biology, only have the chance of succeeding under the protective umbrella of good enforcement. This becomes possible under the Columbia Basin Salmon Enforcement Team. This is a truly unique task force made up of the State, Tribal, and Federal law enforcement departments of the Columbia River basin. Inlcuded in this consortium are Oregon State Police, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, National Marine Fisheries Service, Columbia River Inter-Tribal Fisheries Enforcement, Montana Department of Fish, Wildlife, and Parks, U.S. Fish and Wildlife Services, Shoshone-Bannock Tribal Fish and Game Law Enforcement, Umatilla Tribal Police, and Nez Perce Tribal Fisheries Enforcement. Though each entity has its own unique mission, all share a common goal and commitment, the “gravel to gravel” (sea to tributary spawning areas) protection of salmon, steelhead, and resident fish, and the habitats that sustain them all.

The enforcement team functions in a coordinated collaborative land, water, and air effort aimed at providing maximum enforcement coverage, while simultaneously reducing both unnecessary redundancy or enforcement gaps. Strategies are geared to be able to respond equally day or night to emergencies or emergent issues and predictable events, as well as to coordinate and sustain long-range multi-year efforts, such as our ongoing pump-station/screening checks. Enforcement emphasis is on deterrence of violations before damage occurs and increasingly to habitat protection.

9202601

Grande Ronde Model Watershed - Admin/Impl./Research

SPONSOR/CONTRACTOR:
Patty Perry, USFS (541/962-6590)

GROUP:
Anadromous Fish

ABSTRACT:
Project Background

With the imminent Endangered Species Act (ESA) listing of spring chinook salmon on the horizon, the Union County Commission and Wallowa Court determined that a grass-roots, locally based effort working to coordinate existing local, state, and federal programs could effectively maintain, enhance, and restore our watershed. Joining in this effort, the Northwest Power Planning Council selected the Grande Ronde basin as a model watershed for Oregon, and the Governor's office through the Strategic 'Water Management Group certified the program. Bonneville Power Administration provides the administrative funding.

Appointed in May 1992, the Grande Ronde Model Watershed Program Board of Directors (Board) represents a diverse group of interests with the common vision of a healthy watershed. Participants include stock-growers, farmers, tribes, environmentalists, elected offtcials, and public lands, community, forestry, and fish and wildlife representatives.

A watershed can be managed to:

Maintain and enhance natural aquatic biological diversity.
Enhance or protect threatened species populations.
A" A Maximize natural resource yields in wildlife, water, commodities, or human uses.
A" A Support the economic and social livelihood of a community.

With that understanding, the Board formulated a mission statement which incorporates many of these elements. It is to "develop and oversee the implementation, maintenance, and monitoring of coordinated resource management that will enhance the natural resources of the Grande Ronde basin." Although addressing multiple elements in watershed restoration is perhaps more difftcult that pursuing a single purpose, the Board felt this approach essential.

The basin encompasses the Blue Mountain region of northeastern Oregon. It is approximately 13,689 km2 (5,265 mi2) in size and has 280 streams and rivers containing over 4,160 km (2,600 mi) of fisheries. Land ownership is approximately 65 percent public and 35 percent private. The basin supports numerous healthy populations of fish and wildlife, as well as the ESA-listed spring chinook salmon.

Initial Steps

An important first task was developing memorandums of understanding to create partnerships with local residents, state and federal agencies, tribes, and interest groups concerned with the management of

the Grande Ronde watershed. From there, stream survey data available from state and federal agencies were compiled into a Habitat Assessment. This assessment was peer reviewed and accepted by the Board. This provided a sound "starting point" to develop a plan and focus restoration activities.

A technical committee was formed consisting of biologists, hydrologists, a soil scientist,' forester, and other resource specialists to advise and provide recommendations to the Board on planning direction, technical issues, and to review and evaluate project proposals for technical merit and adequacy. Local agency staffs, the tribes, and private individuals with technical expertise are playing a crucial, key role in the model watershed process by serving on this committee. Reviewing project proposals has become one of the main functions of the technical committee, and is an effective means for ensuring cooperation and coordination among agencies and the various projects and activities in the basin.

Model Watershed Action Plan

Next the Grande Ronde Model Watershed Operations-Action Plan was prepared. It serves as a basin-wide framework to identify priority (for spring chinook salmon) subwatersheds for more detailed planning. It incorporates information gathered from several prior planning documents as well as the Habitat Assessment. The plan includes restoration criteria to aid in the process of prioritizing project actions. Staff is continuing to develop detailed subwatershed plans and project actions, working with landowner groups and others as appropriate. Landowner participation in this process is completely voluntary.

Additionally, the model watershed program initiated the Grande Ronde Ecosystem Diagnosis and Treatment (GREDT) study. This was undertaken to provide technical information to the Board and technical committee in their effort to plan and implement watershed restoration activities. The study was motivated by a need for a science-based methodology that promotes effectiveness and accountability. The analysis focuses on spring chinook salmon, which serves as a diagnostic species in assessing the condition of the watershed for sustainability of its resources and related societal values. This study assumes that humans and their values are integral parts of an ecosystem and that human communities within the Grande Ronde basin desire a healthy watershed+ne that can sustain natural resources as well as economic and social values for future generations.

An effectiveness monitoring strategy has been developed and will be incorporated in each subwatershed plan. On-going monitoring efforts will be identified, coordinated, and used to establish gaps that need to be addressed. Each project action also contains a monitoring component. Several projects include monitoring by local high school students.

The Grande Ronde Model Watershed Program serves as an educational forum for landowner groups through coordination with the Oregon Cattlemen's Association and local Soil and Water Conservation Districts. Additionally, the model watershed program is defining for itself a role as facilitator of improved dialogue between local, state, tribes, and federal natural resource management agencies. The model is especially helpful in encouraging coordination on issues beyond normal jurisdictional boundaries, and creating cooperative and incentive-based ways to encourage private landowners to take part in restoration efforts.

Habitat Restoration Progress

The model watershed program has assisted in developing many project proposals for habitat restoration in the basin. These projects involve private landowners, schools, organizations, tribes, and local, state,

and federal government agencies. Funding has been recommended and secured for approximately 140 worthy, well-designed projects. The scope of these projects address factors such as:

Fish passage structures/irrigation diversion improvements.
Riparian and rangeland livestock management/off-stream water development.

* Sediment.
* Erosion reduction.
* Water quality and quantity.
A" A * Fish habitat.
* Technical seminars addressing riparian grazing.
* Education.

Implementation of these projects is in various stages, with the majority of them completed. Funding for these projects is available through private landowners, Oregon Watershed Health Program (state lottery funds), Bonneville Power Administration, Bureau of Reclamation, and other state and federal agency programs, as well as private groups and organizations.

Long-term project planning is ongoing, creating an advantage in securing and utilizing habitat restoration funds as opportunities arise. Project proposals in priority'subwatersheds are developed with the objective to address identified environmentaI conditions such as fish passage problems, substandard riparian conditions (i.e., streambank erosion, streambed sedimentation, altered channel morphology, loss of pools, and reduced habitat complexity), upland conditions producing sediment, poor water quality, and depleted flow conditions.

In conclusion, the Grande Ronde Model Watershed Program is an exciting and innovative experiment in citizen-based natural resource planning by coordinating among all entities involved-in watershed activities in the basin and is charged with providing a model for other watershed basins to consider.

Considerations

It takes time to create partnerships and develop a strong basin council. Being based in local county government has been very positive and offered additional opportunities. A watershed council must allow for a diverse group of interests, local agendas, and perspectives.

Planning is vital before moving to projects. The key is a local assessment of environmental conditions in order to establish priorities driven by the local governments, agencies, tribes, and community. The time expended for this is also well utilized in developing local consensus and unity.

Realize project development is very time consuming, and many local entities must be involved and incorporated in the process. Implementation is a multi-year process, recognizing our actions today will make a difference in the quality of our environment 25-50 years from now.

The availability of administrative and technical assistance/support to the watershed council is a crucial component.

Eastern WA Model Watershed Coordinators

SPONSOR/CONTRACTOR:
Bob Bottman, Washington State Conservation Commission (360/407-6204)

GROUP:
Anadromous Fish

A B S T R A C T :
Project Location:
Asotin Creek Watershed, Asotin Creek, Asotin County
Pataha Creek Watershed, Tucannon River, Garfield County
Tucannon River Watershed, Tucannon River, Columbia County

Relationship to Anadromous Restoration Goals: 1994 Columbia River Basin Fish and Wildlife Program, Measures 7.7A and 7.7B.

Background: In 1992, the Conservation Commission entered into a contract with the Bonneville Power Administration for the development of three model watersheds in Washington State, with guidance from the Northwest Power Planning Council. The Commission was designated-the lead for this program in Washington State.

The Commission selected three conservation districts -- Asotin County, Pomeroy, and Columbia -- as sub-contractors on a model watershed within each of their jurisdictions. Conservation districts were chosen because they provide the most direct and credible access to private landowners. Also, as members of the local community, conservation district supervisors are able to foster change in land management practices among their peers, where federal or state agencies would be viewed as regulators.

From the beginning, the three model watershed districts were committed to the Coordinated Resource Management Planning (CRMP) process. CRMP has the ability to develop sensible management schemes to protect natural resources while meeting the economic needs of the private sector -- this was seen by the Commission and the districts as vital to the success of the program. All three districts established'landowner steering committees as core working groups early in the process.

The model watershed districts began work in 1993. The Asotin County Conservation District, working with their landowners and volunteers, developed a mission statement that could be used to sum up the goal of all three model watersheds:
"Complete and implement an integrated plan for the Asotin Creek watershed which will meet landowners objectives and agency acceptance, in order to protect and enhance all resource bases with concern for long-term sustainability."

Status: The Asotin County Conservation District published the Asotin Creek Model Watershed Plan in April 1995. The Pomeroy Conservation District will publish the Pataha Creek Model Watershed during the spring of 1997. The Columbia Conservation District will publish the Tucannon River Model Watershed Plan in the spring of 1997.

All three districts have worked on selected early implementation projects that could be used as

demonstration sites. The 1996-97 winter flooding damaged some of these sites. Specific early implementation projects included:

Asotin Creek - root wads, rock and log barbs, boulder placement, large woody debris, and vortex rock weirs.
Pataha Creek - off-site watering facilities, streambank stabilization, riparian fencing and buffer strips, removal of blockages to' fish passage, and improvements to stream crossings.
Tucannon River - rock vortex weirs, rock barbs, root wad revetments for streambank stabilization, and sediment basin repair.

Funding and Cost-Shares: From October 1, 1992 through September 30, 1997 the Bonneville Power Administration has provided $554,410 in grant funds to the Washington Conservation Commission for the Eastern Washington Model Watershed projects.

During the period from July 1, 1993 through June 30, 1997 the Conservation Commission has provided $900,000 in state grant funds to the model watershed districts to be used for program expenses and cost-sharing with private landowners.

Project Partners:

Private landowners in the three model watersheds
USDA.Natural Resources Conservation Service
USDA Forest Service
Cleat-water Company
Bonneville Power Administration
Washington Department of Ecology
Washington Department of Fish & Wildlife
Washington Department of Natural Resources
Washington Conservation Commission

Idaho Model Watersheds Admin/Impl. Support

SPONSOR/CONTRACTOR:
Biff Burleigh, ID Soil Conservation Commission (208/334-0217)

GROUP:
Anadromous Fish

ABSTRACT: *
Lemhi River basin, Pahsimeroi River basin and East Fork Salmon River basin watershed restoration planning and implementation.

9202604

Spring Chinook Salmon Early Life History

SPONSOR/CONTRACTOR:
Richard W. Carmichael, ODFW (541/962-3777)

GROUP:
Anadromous Fish

ABSTRACT:
This study was designed to provide new information on population specific life history strategies of Grande Ronde basin spring chinook salmon populations. We are determining seasonal movements, rearing distribution, abundance, and survival of juvenile spring chinook salmon from the upper Grande Ronde River and Catherine Creek. We have identified two general life history strategies: 1) juvenile chinook salmon migrate out of summer rearing areas and overwinter in valley sections of the Grande Ronde River and Catherine Creek and begin their seaward migration in the spring; 2) juvenile chinook salmon remain in the summer rearing areas through the winter and begin seaward migration in the spring. Although the migration patterns were similar for both populations, the proportion of fish exhibiting the fall migration strategy was substantially greater for the Catherine Creek population. Within each population we PIT-tagged groups of fish representing fall migrating, upstream winter rearing, and spring migrating juveniles. Data from recaptures at our rotary screw traps and at mainstem Snake and Columbia river dams indicates that fish that overwintered in valley habitats leave the valley as smolts and arrive at Lower Granite Dam earlier than fish that overwinter upstream. Furthermore, fish that overwinter in valley habitats have been recaptured at the dams at consistently higher rates than fish that over-wintered upstream.

Overall, recapture rates that the dams ranged from 5 to 55% and were consistently highest for fish tagged as spring migrants, followed next by fish tagged as fall migrants, and lastly by fish tagged in upstream rearing areas. No consistent population differences were evident in mainstem dam recapture rates. Multiple recaptures of tagged-fish allowed us to determine differences in mean size and individual growth. Preliminary analysis of size data indicates that fish from Catherine Creek exhibited better spring growth resulting in larger smolts than those from the upper Grande Ronde. Mark-recapture data from rotary screw traps was used to estimate the abundance of migrants leaving rearing areas. Estimates for the upper Grande Ronde population were 26,4 17 and 1,15 1 for migration years (MY) 93-94 and 95-96 respectively. Estimates for the Catherine Creek population were 18,780 juveniles for MY 94-95 and 6,341 for MY 95-96. We think the substantial decline in production in MY 95-96 is a result of a reduced number of spawners in 1994 combined with a high mortality of early life stages from extensive floods in the winter and spring of 1995.

Recommendations to managers include protection and enhancement of valley habitats in the Grande Ronde River and Catherine Creek and priority restoration and protection of rearing habitat, in the upper Grande Ronde. In 1996, this study expanded into local populations in the Wallowa River subbasin. We will continue monitoring these local populations at the current level and hope to initiate additional work to evaluate the preponderance of alternate juvenile life history strategies, examine mortality by juvenile life stage, and determine the importance of tributaries to juvenile spring chinook salmon production.

Fish Screen Oversight Committee (FSOC), Tributary Passage and Habitat Coordinator (TPHC)

SPONSOR/CONTRACTOR:
Clayton Hawkes, CBFWF (503/326-703 1)

GROUP:
Anadromous Fish

ABSTRACT:
The Fish Screen Oversight Committee (FSOC) was established in response to Measure 7.l0A of the Northwest Power Planning Council's Fish and Wildlife Program to coordinate implementation of the Program's fish screening measures. FSOC is made up of state, federal, Council, and tribal representatives involved in fish screening activities. The Columbia Basin Fish and Wildlife Authority provides facilitation and coordination services for FSOC.

Federal Mitchell Act (MA) funds, administered through the National Marine Fisheries Service, are the largest and most important source of funding for fish passage work in the Columbia River Basin. Fish screening programs, utilizing this funding source, are administered by state fish and wildlife agencies.

Idaho and Oregon utilize the majority of federal MA screening funds. Oregon, for example, operates and maintains about 450 rotary drum fish screens in the John Day, Umatilla, and Grande Ronde basins. Washington, in contrast, receives little MA funding for its screening programs.

All three states also receive significant funding from the Bonneville Power Administration (BPA) for fish screening activities. BPA and MA funds were used in the construction of fully equipped fish screen fabrication shops in Oregon and Idaho, as well as for the actual screening of irrigation systems. BPA has also funded the consolidation of irrigation canals, eliminating whole diversions and their fish screening needs. The majority of funding for fish screening in Washington comes from BPA or state funds.

Reductions in federal moneys for fish screening, both in MA funding and from BPA, in the last two years have caused some real concern for Columbia Basin fishery managers. First, construction funds to replace older fish screening devices from the 1950's and 1960's in Oregon have been greatly reduced. These screens are not in compliance with newer protection criteria, and are mostly worn out after, in many cases, more than 40 years of continuous use.

Second, fish screening operation and maintenance costs are in jeopardy. Most MA funding, particularly in Oregon and Idaho, is used for the operation and maintenance (O&M) costs of existing rotary drum screens. Currently, in Oregon, most irrigators (with diversions under 30 cfs) have no legal obligation to install or maintain fish screens at their diversions. Idaho irrigators do have such a legal obligation, but Idaho currently utilizes MA funding for this purpose anyway to ensure proper O&M at most screen sites. Further significant MA reductions could threaten these existing state programs.

Washington is in a stronger position in regards to fish screening O&M in the Columbia Basin. Not only is landowner maintenance of Columbia Basin fish screens mandatory under state law, but since

1983, the irrigation community and Washington Department of Fish and Wildlife (WDFW) have worked together to provide workable options for maintenance. In "Washington, landowners can either handle maintenance themselves or contract with WDFW to handle it for them. WDFW also employs two field inspectors within the Basin to follow up with landowners to ensure that maintenance is up to date. Different laws and circumstances in Washington have allowed WDFW to take,a stronger oversight role on O&M issues. In Oregon, only the larger irrigator (with diversions over 30 cfs) have a legal obligation to provide for fish screening, including maintenance.

Life-Cycle Model Development and Application to System and Subbasin Planning in Snake River

SPONSOR/CONTRACTOR:
Danny Lee, USFS (208/364-4386)

GROUP:
Anadromous Fish

ABSTRACT: *
Improve decision-support tools for (1) assessing overall program effectiveness, and more specifically (2) assessing the impacts of land-use,activities on resident and anadromous salmonids.

9204000

Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research

SPONSOR/CONTRACTOR:
Tom Flagg, NMFS (206/842-7 18 1)

GROUP:
Anadromous Fish

ABSTRACT:
The National Marine Fisheries Service (NMFS) is maintaining captive broodstocks of ESA-listed endangered Redfish Lake sockeye salmon. Captive broodstock programs are a form of artificial propagation where fish are cultured in captivity for most or all of their life cycle. The relatively high fecundity of anadromous Pacific salmon, coupled with potentially high survival in protective culture, should allow captive broodstocks to produce large numbers of adults and juveniles to help "jumpstart" the population. Implementation and refinement of captive broodstocks for the recovery of Snake River sockeye salmon are identified as a priorities in the proposed Recovery Plan for Snake River salmon. The NMFS captive broodstocks are complementary to those reared by the Idaho Department of Fish and Game (IDFG) and are intended to reduce the risk of catastrophic loss of this valuable gene pool. The source of NMFS captive broodstocksare juvenile and adult fish captured, held, and spawned by IDFG. Since 1991, only 15 sockeye salmon adults (zero to eight individuals per year) have returned to Redfish Lake. NMFS has captive broodstocks for 199 l-, 1993-, 1994-, and 1996-broods (no females returned in 1992 and 1995). The fish are reared to adult either full term in fresh well water or from smolt to adult in a pumped, filtered, and UV-sterilized seawater system. Pre-spawning adults, eyed eggs, and juveniles are returned to Idaho to aid recovery efforts. Fry to adult survival of 1991-brood fish was about 14% and eyed-egg viability of spawners in fall 1994 was about 60%. This spawning produced about 46,500 viable eggs; a direct amplification of about 47 times the 991 1991-brood eggs taken by NMFS into protective culture. Fry to adult survivalof 1993-brood fish was about 78% and eyed-egg viability of spawners in fall 1996 was about 57%: This spawning produced almost 400,000 viable eggs; a direct amplification of about 209 times the 1,939 1993-brood eggs taken into protective culture. An additional 250 1993-brood are expected to spawn in fall 1997 and should further add to amplification ratios for this brood. The relatively high juvenile survival of the 1994-brood (64%) and 1996-brood (97%) in protective culture should result in continued production of up to 400,000 eggs yearly at fish maturity in 1997-2000. It is virtually certain that without the boost provided by these captive broodstocks, Redfish Lake sockeye salmon would soon be extinct.

Evaluation of Adult Salmon and Steelhead Migration Past Dams and Through Reservoirs in the Lower Columbia River and Into Tributaries

SPONSOR/CONTRACTOR:
COE

GROUP:
Anadromous Fish

ABSTRACT:
A study to evaluate passage of adult salmon, steelhead, and lamprey at dams and through reservoirs in the lower Columbia River and its tributaries was launched in 1996. Project planning and installation of radio telemetry equipment began in 1995 and release of fish with transmitters began in April 1996. Data from receiver sites (24 receivers and 96 antennas at Bonneville alone) are sent to National Marine Fisheries Service in Seattle for initial processing, then sent to the Unit in Moscow for coding, then back to Seattle for creation of summary tables, and then back to Moscow and Pasco for analysis and report preparation.

During April, May, and June of 1996,853 adult spring and summer chinook salmon were captured in the trapping facility adjacent to the north-shore ladder at Bonneville Dam, outfitted with transmitters, tagged with a visual-implant tag, and released **about** 8 km downstream from the dam. Half of the fish were released at Dodson on the Oregon shore.

In 1995 we were unable to capture chinook salmon downstream from Bonneville Dam with Merwin traps and had to use the trapping facilities at Bonneville Dam to capture fish in 1996. There was concern that fish taken for the north-shore ladder might not be representative of the run. To evaluate that concern, we tracked fish as they migrated back up to the dam, recorded location of passage at the dam, and the ultimate destination. Based on preliminary analyses, we did not find evidence that salmon taken from the north-shore ladder would be a biased sample of the run.

Flows in the Columbia River in 1996 were significantly above the last 15 year average, and passage of the spring chinook salmon run at Bonneville Dam was 2-3 weeks later than usual; Because of the high flows and large amounts of spill, there was concern that fallback of salmon at the dams might be higher than usual. Our preliminary estimate of fallback for spring chinook salmon at Bonneville Dam was about 15% in 1996. Three-fourths of the fallbacks occurred through the spillway, 18% via a presently unknown route, 2% each through the navigation lock or ice and trash flumes, and 1% through ladders. Eighty-three percent of the fish that fell back over the dam had previously passed the dam via the Bradford Island ladder.

Passage of spring and summer chinook salmon through the lower Columbia River and into tributaries was at near average rates in 1996, despite high flows and spill. In the Snake River, however, there is evidence of lower than average rates of passage in 1996. The count of adult spring chinook salmon at Lower Granite Dam in 1996 was 0.70 of the count at Ice Harbor Dam, compared to 0.85 for the previous lo-year average. Preliminary estimates of Ice Harbor to Lower Granite passage for spring and summer chinook salmon with transmitters was 0.35 in 1996 versus 0.85 in 1991-93.

Based on preliminary analysis of chinook salmon passage rates through the Oregon-shore ladder at the Dalles Dam, the shad fishery in the forebay at the top of the ladder did not appear to affect passage of salmon.

From June to October, 770 steelhead were trapped at Bonneville Dam, outfitted with transmitters, and released at the two release sites downstream from the dam. Steelhead proceeded upstream, passing the dams, and entering many of the tributaries, some temporarily.

During June and July, 100 lamprey were captured and transmitters surgically implanted before releases at the two site downstream of Bonneville Dam and in the forebay near Cascade Locks. Lamprey were tracked as they migrated back upstream from the release sites and are being recorded as they pass the dams into tributaries.

The passage of adult salmon, steelhead, and lamprey at dams and through reservoirs in the lower Columbia River and its tributaries will be evaluated in 1997 in the second of the five-year project. Plans are to trap and outfit with radio transmitters 800 spring and summer chinook salmon, 800 steelhead, 600 sockeye salmon, and 200 Pacific lamprey. All fish will be collected and trapped at Bonneville Dam and released 8 km downstream from the dam, as in 1996. Fish with transmitters will be monitored as they pass lower Columbia Dams, enter tributaries, and migrate into the lower Snake and mid-Columbia rivers. Mobile tracking from boats will be used to characterize movement of salmon and steelhead in the forebay of Bonneville Dam with respect to the occurrence of fallback events. Mobile tracking from trucks and on foot will be used to assess movement of lamprey with transmitters as they reach and pass over Bonneville Dam.

Integrated Hatchery Operations Team

SPONSOR/CONTRACTOR:
Pam Kahut, PSMFC (503/650-5400)

GROUP:
Anadromous Fish

ABSTRACT:
The Integrated Hatchery Operations Team (IHOT) was formed in 1992 to implement Section 6.2B of the Northwest Power Planning Council's Fish and Wildlife Program. Currently 16 state, federal, and tribal entities participate on the IHOT. The purpose of IHOT is to increase the effkiency of anadromous fish artificial production facilities in the Columbia River Basin through improved hatchery operating practices. To accomplish this the IHOT first developed the following documents:

1, Existing Policy Affecting Hatcheries in the Columbia River Basin: Combined Reports.(1992).

2. Operation Plans for Anadromous Fish Production Facilities in Columbia River Basin. Volumes I-V (1993).

3. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (1994).

4. Implementation Plan for Integrating Regional Hatchery Policies (1994).

5. Operation Plans for Anadromous Fish Production Facilities in Columbia Rive Basin. Volumes I-III (1995).

In addition, the IHOT has developed an unprecedented level of understanding, cooperation, and coordination among the fishery co-managers of the Columbia River Basin and is the only forum in the region where fish hatchery practices are discussed in a non-adversarial manner with the goal of improving over-all production.

Currently the region's hatcheries are being audited by the firm of Montgomery Watson to measure compliance with the IHOT criteria and standards. The IHOT representatives are assisting in these audits and are reviewing the draft audit reports. The IHOT will develop comments on the draft audit reports and prioritize the remedial actions identified.

Future IHOT activities may include:

1. Follow-up to assure that remedial actions identified through the audit process are implemented and that regional hatchery criteria and standards are updated as necessary.

2. Periodic review and update of the regional hatchery criteria and standards.

3. Acting as a forum for prioritizating the use of limited regional artificial production funds to assure their most efficient use.

4. The use of IHOT to discuss anadromous fish production issues identified in subbasin plans and the new arenas of watershed rehabilitation and management.

5. The use of IHOT to distribute findings and for follow-up on the implementation of adaptive management recommendations derived from monitoring and evaluation.

Amazon Basin/Eugene Wetlands - Phase II

SPONSOR/CONTRACTOR:
Cathy MacDonald, The Nature Conservancy (503/230-1221)

GROUP:
Wildlife

ABSTRACT:
The goal of Phase II of the BPA Willow Creek Wildlife Mitigation and Enhancement Project is to implement the 1995 Management Plan prepared for the Willow Creek Natural Area. Located on the edge of the city of Eugene, the 335 acre Willow Creek Natural Area is managed by The Nature Conservancy (TNC) and supports a variety of wetland and upland habitats typical-of the Willarnette Valley. These habitats include willow-cottonwood-ash riparian woodlands, wet prairie, forested wetlands dominated by Oregon ash, as well as areas of upland prairie, old fields, oak woodland, and conifer stands. In conjunction with the Management Plan, a Habitat Evaluation was conducted to identify the current and potential Habitat Units (HU's) the site could provide for seven target species: Beaver, Black-capped Chickadee, Red-tailed Hawk, Valley Quail, Western Meadowlark, Yellow Warbler, and Western Pond Turtle. Potential HU's are based upon implementation of the habitat enhancements described for the proposed action alternative in the Management Plan.

Phase II project activities planned for 1997 include a variety of wildlife habitat maintenance and enhancement tasks, including restoration of open prairie habitats, stabilization of areas of streambank erosion, and removal of invasive non-native species. A hydrologic management plan is being developed and implemented to set baseline hydrologic conditions and identify actions that can be taken to maintain important hydrologic features. In addition, maintenance activities include defensibility monitoring, trash removal, and other projects to minimize unauthorized uses. Many of the projects will be implemented by summer youth work crews, and by volunteers from the local community. The project is also part of the larger West Eugene Wetlands Plan, an innovative comprehensive wetlands plan that covers a 7500 acre study area and is being implemented by a partnership that includes TNC, the City of Eugene and the Eugene District of the Bureau of Land Management.

9206100

Albeni Falls Wildlife Mitigation Implementation (formerly Pend Oreille Wetlands [IDFG] - Phase I)

SPONSOR/CONTRACTOR:
Jerome Hansen, IDFG (208/334-3078)

GROUP:
Wildlife

ABSTRACT:
Important native wetland, riparian, and upland wildlife habitats have been impacted by many land use and development activities in northern Idaho, including the construction of Albeni Falls Hydroelectric Project on Lake Pend Oreille. In August 1988, the Albeni Falls Loss Assessment and Mitigation Plan was completed. The largest impacts to wildlife habitat occurred in the Clark Fork and Pack River deltas, including the loss of 6,6 17 acres of emergent wetlands and the loss of 8,900 of deep water marsh. The goal of the the Albeni Falls Wildlife Mitigation Implementation project is to protect and enhance the long-term quality and quantity of wetland, riparian, and upland habitats in the delta areas, as well as other identified areas around Lake Pend Oreille. Partners in this effort include a variety of agencies, local governments and organizations, and members of the public. Outcomes include long-term benefits to many target and non-target wildlife species, resident fish, and the achievement of mitigation for Albeni Falls.

Technical Assistance for Juvenile and Adult Migrant Monitoring Facilities

SPONSOR/CONTRACTOR;
Dr. Thomas J. Carlson, Battelle Pacific Northwest National Laboratories (509/376-7875)

GROUP:
Anadromous Fish

ABSTRACT:
This project was initiated in 1993 and began by providing- technical assistance to upgrade the prototype separation-by-code (SBC) system developed by the National Marine Fisheries Service (NMFS) for detecting Passive Integrated Transponder (PIT) tags. Over the next 2 years, the project expanded as the Pacific States Marine Fisheries Commission (PSMFC) decided to replace their current monitoring computer program with the SBC system and the fisheries community switched from the current 400-kHz tag system to a 134.2-kHz tag system. This change required that several modifications had to be incorporated into the first software product. Over the span of this project, Pacific Northwest National Laboratory (PNNL) has provided hardware and software engineering assistance in the design, prototype construction, installation, and testing of the enhancements to existing PIT-tag software. The project is currently involved in a variety of activities, including upgrading the initial SBC hardware and software, preparating technical protocols for testing and evaluation of prototype low-frequency PIT-tag systems, and helping implement the program plan for upgrade of new low frequency PIT-tag systems in the Columbia River Basin.

One of the initial key deliverables by PNNL for this task was software (SLIDEGT) that permitted the tag code of a fish passing through the PIT-tag interrogation system to be recorded, looked up in a database , and, if appropriate, activate a slide gate to separate that fish. This entire operation had to be accomplished in the few milliseconds it took the fish to pass down a water-filled flume from the interrogation coils to the slide gate. In 1996, the separation-by-code program was successfully used at Lower Granite and Little Goose Dams by five different research projects. Input from these researchers was also used to modify and improve MULTIMON (multitask monitoring program) and REPORT (REPORT is a utility used by the researcher to analyze data collected by MULTIMON). The objective of this task in FY 1997 is to enhance the existing PC-based system currently controlling PIT-tag interrogation facilities at hydropower dams in the Columbia River system. The scheduled enhancements will provide additional data transmission and facility operational status communication capability, new multiprocessing capability and user interface, and will permit system users with real-time capability for monitoring tagged fish.

9207300

An Automated Fish Marking and Tagging System

SPONSOR/CONTRACTOR;
Lee Blankenship, WDFW (206/902-2748)

GROUP:
Anadromous Fish

ABSTRACT: *
Develop an automated mass-marking technique for juvenile salmonids that removes adipose fin an&or applies coded-wire tag without human handling or anesthetic.

Symptoms-of Gas Bubble Trauma Induced in Salmon by Total Dissolved Gas Pressure Supersaturation in the Snake and Columbja Rivers

SPONSOR/CONTRACTOR:
Dr. Tom Backman, Columbia River Inter-Tribal Fish Commission (503/73 1-1267)

GROUP:
Anadromous Fish

ABSTRACT:
Salmon were examined for the incidence and severity of gas bubble trauma symptoms (symptoms) in the Columbia and Snake rivers. Total dissolved gas supersaturation (supersaturation) often exceeds the 110% State and Federal level during periods of high-river flows or controlled spills at hydroelectric dams to pass migratory juvenile salmonids. A variance in the standard up to 120% was granted by State Agencies beginning in 1994 for a controlled-spill program to pass juvenile salmon, however the gas concentrations were sometimes higher during periods of uncontrolled spill. Salmon were examined as part of an smolt monitoring program (SMP) at the dams. The SMP has been criticized for not representing fish from the river (in-river fish). Our objectives were to determine the incidence and severity of symptoms of in-river fish and evaluate SMP data for bias. In-river juvenile salmon were sampled with purse seines and trawls and examined with 40X dissecting microscopes to record the frequency and severity of symptoms.

Symptoms were observed in 4.5 % of 5000 in-river origin fish examined. Bias at the dams was mixed. Upward bias was noted at some dams. A low risk to gas bubble disease was observed when supersaturation levels remain at or below 120% supersaturation.

9301900

Hood River Production Program (Parkdale Design & Construction)

SPONSOR/CONTRACTOR:
Paul Johnson, ODFW (503/229-5695)

GROUP:
Anadromous Fish

ABSTRACT:
The Hood River Production Program (HRPP) is a fish supplementation project in the lower Columbia Basin funded by Bonneville Power Administration (BPA) and jointly implemented by the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) and the Oregon Department of Fish and Wildlife (ODFW). The primary goals of the HRPP are to (1) re-establish naturally sustaining spring chinook salmon using Deschutes stock in the Hood River subbasin, (2) rebuild naturally sustaining runs of summer and winter steelhead in the Hood River, (3) maintain the genetic characteristics of the' population, and (4) contribute to tribal and non-tribal fisheries, ocean fisheries, and the Northwest Power Planning Council's (NPPC) goal of doubling salmon runs in the Columbia Basin.

In accepting the Hood River Production Master Plan, the NPPC recommended adopting a three-phased approach which included collecting three years of baseline information, project implementation and facilities construction and follow-up monitoring and evaluation studies. Comprehensive collection of data began in the Hood River subbasin in late, 1991, including information on the life history and production of anadromous salmonid stocks returning to the Hood River subbasin. Information collected by the HRPP was used to prepare an environmental impact statement (EIS) evaluating the program's impact on the human environment.

In 1995, following three years of collecting baseline information, the HRPP moved into project implementation and facilities construction. Among other things, this phase of the project included utilizing Hood River native winter steelhead for hatchery broodstock, and converting the spring chinook hatchery program from Carson to Deschutes stock and rearing them in Pelton Ladder. The spring chinook rearing program in Pelton Ladder was initiated after earlier studies by PGE biologists were able-to show growth and survival advantages with ladder reared spring chinook. Winter steelhead broodstock development actually started in 1992 because of concerns for the availability of wild winter steelhead in the Hood River based on low returns back to the Powerdale Dam adult trap. Techniques such as matrix spawning, acclimation and volitional release of hatchery fish were to be used to improve survival and homing ability and to reduce residualism with wild juvenile salmonids. Also, HRPP is developing a habitat restoration plan to guide habitat projects in the Hood River subbasin.

A major component of HRPP is construction of facilities to handle broodstock development and changes in production. To date, renovations have been made to Pelton Ladder for rearing juvenile chinook, and an adult trap has been built to collect brood and gather M&E data at Powerdale Dam. Projected for construction within the next two years will be an adult holding, spawning and acclimation facility in the Hood River subbasin and expansion of isolation/incubation and rearing capability at Oak Springs Hatchery.

Survival Estimation for Dam/Reservoir Passage

SPONSOR/CONTRACTOR:
Dr. John Williams, Dr. Bob Iwamoto, Bill Muir, NMFS (206/860-3277)

GROUP:
Anadromous Fish

ABSTRACT:
Survival estimates were made for PIT-tagged juvenile chinook salmon, Oncorhynchus tshawytscha, and steelhead, 0. mykiss, that migrated through Snake River dams and reservoirs from 1993 through 1996. The Single-Release Model (a multiple-recapture model) was used to estimate survival based on detections of PIT-tagged fish at the dams. The length of river over which survival estimates were made varied between years and was dependent on the number of darns with the capability to re-release detected PIT-tagged fish back to the river, the total number of fish marked, and the efftciency of detection of PIT-tagged fish at each dam. Precision of survival estimates varied with the number of fish PIT-tagged and released, and the amount of spill at dams with PIT-tag detectors. When spill levels were high, capture efficiencies were lower and precision of estimation was decreased. Mortality at bypass outfall sites (an important model assumption) was insignificant at all of the Snake River dams investigated. Per-project (a combination of reservoir and dam passage) survival estimates ranged from 85 to 92% for hatchery yearling chinook salmon and from 84 to 95% for hatchery steelhead. Per-project survivals averaged greater than 90% for both species in years with high flow and spill conditions. These per-project survival estimates are higher than estimates from the 1970s under similar flow conditions. Survival of fish released from Snake River Basin hatcheries to Lower Granite Dam tailrace was consistent within hatcheries across years and varied inversely with migration distance.

9303000

Buck Hollow Watershed Enhancement (SWCD)

SPONSOR/CONTRACTOR:
Ron Graves, Wasco Co SWCD (541/296-6178)

GROUP:
Anadromous Fish

ABSTRACT:
The Buck Hollow Project is a voluntary, cooperative watershed improvement project aimed at restoring watershed health. This project considers all the resources in the watershed and takes a top-down approach. It treats both uplands and riparian areas beginning in the upper reaches of the watershed and continuing down toward the mouth. A balanced approach using both structural and vegetative improvements is making a clear difference in the watersheds.

The 126,000 acre Buck Hollow watershed has its headwaters near Shaniko. From there, the mainstem of Buck Hollow Creek runs north and west to its mouth just below Shearar's Falls. Home to a variety of wildlife and fish species, the primary species of concern is summer steelhead. Steelhead numbers in Buck Hollow and other lower Deschutes tributaries have been severely depressed in recent years. Development and Implementation of Conservation and Grazing Management Plans to reduce peak runoffs and associated erosion, improve water quality, fish and wildlife habitat, and watershed productivity are principal goals.

Implementation of the Buck Hollow Watershed Project began in 1991 with the initial phases focused on upland treatments. At that time, a handful of landowners were participating. Bonneville Power Administration began supporting fish habitat improvement elements of the project in 1993. USDA Natural Resources Conservation Service (NRCS) PL-566, Small Watershed Program assistance was approved to begin in 1995. Funding for the project has come from a variety of sources: Oregon Governor's Watershed Services Agency, Northwest Steelheaders, USDA NRCS, Bureau of Land Management, and others. Today the project is approximately 50% complete and enjoys'the universal support of the landowners with virtually 100% participation.

The Buck Hollow Watershed Project exemplifies the value of using a "watershed approach.,"
Project Accomplishments*
Sediment Basins: 54 each
Terraces: 75,210 ft.
Grassed waterways: 2 acres
Seedings: 756.7 ac.+(200 ac. scheduled spring 1997)
Tree plantings: >5,500 trees
Fencing: 123,546 ft.
Juniper & Brush Control: 95 acres
Spring Developments: 8 each
Streambank stabilization: 5.2 miles (juniper deflectors & rip-rap)
D Class segment treated: 1 for 1.75 acres
Riparian plantings: 6.5 miles
Riparian pastures: 9 +(4 in progress)
Riparian exclosures: 1 +(1 scheduled 1997-98)

Wildlife & upland tree planting: 4 acres
Conservation & grazing plans: 90,6 17 acres+(12,000 acres in progress)
Watershed Area Treated: 68,580 acres+(34,640 acres Phase 5 in progress)
*Note: does not include Phase 5 (currently in progress)

Observations and Results to date
Hydrology is improving. Using the 10 year, 24-hour runoff event as a yardstick, treated areas have reduced peak runoff events by 24-36%. Spears Canyon sub-basin, a Phase 1 treatment area, has been restored from an ephemeral tributary to a perennial stream.
Wildlife habitat is improving. Wildlife have benefitted significantly from range improvements through increased forage production, rotational grazing systems, and water distribution according to ODFW Wildlife biologist Jim Torland. (This has affected antelope, deer, and elk particularly.)
Steelhead redd counts are up, and importantly, steelhead are now using about 2/3 of the mainstem of Buck Hollow, a considerable increase over previous years.
Water quality is improving. Some stream reaches now meet Oregon's revised east side temperature standards (64 F. - lower summer water temperatures). While the February 1996 floods devastated many areas around the state, Buck Hollow Creek provided clean water to a muddy Deschutes River.

9303501

Lower Red River Meadow Restoration Project

SPONSOR/CONTRACTOR:
Steve Bauer, Pocket Water Inc/River Master Engineering (208/376-3263)

GROUP:
Anadromous Fish

ABSTRACT:
The objective of the Lower Red River Meadow Restoration Project is to restore critical spawning and rearing habitat for wild and naturally spawning populations of spring/summer chinook salmon. Benefits also will occur with wildlife associated with the riparian shrub community. The project sponsor, the Idaho Soil and Water Conservation District, works closely with the landowners, Idaho Fish and Game, Nez Perce Tribe, Division of Environmental Quality, Bonneville Power Administration, and the Nez Perce National Forest on watershed protection and restoration.

Red River is a tributary of the South Fork of the Clearwater River, an important anadromous fisheries production stream in central Idaho. The lower meadow contains 4.4 miles of stream channel which flows through four parcels of private and formerly private ranches. The Red River WMA was purchased by BPA and private foundations in 1994 for the purpose of enhancing fish and wildlife resources.

The meadow reach has been impacted by dredging, conversion to pasture, grazing, and willow removal. Design philosophy is based in restoring natural river and riparian functions. Existing stream channels are reconnected to abandoned channels based on historic channel morphology reconstructed from 1938 aerial photography. The channel elevation is being raised by adding stream length and using rock control sills to raise the bed surface. Streambank height is adjusted to increase natural flooding and wetting of adjacent meadows and decrease bank erosion energy during high flows. Streambanks are being revegetated using native plants and by improving the seedbed and water table for natural regeneration.

In 1996 the project reconstructed 3,200 feet of river channel. In 1997 the project intends to reconstruct 3,000 feet of river channel including 1,560 feet of historic channel. A similar size of project will finish the construction work in 1998 on the Red River WMA. Future years will shift to willing upstream and downstream private landowners.

Haysfork Glory Hole, Newsome Creek Placer Mine Silt Trap - Nez Perce Tribe

SSPONSOR/CONTRACTOR;
R. Ed Larson, Nez Perce Tribe (208-843-7320)

GROUP:
Anadromous Fish

ABSTRACT:
Haysfork Gloryhole, a large placer mine, was abandoned in the early 1900's without mitigation and as a result it contributes large amounts'of sediment to spawning and rearing habitats downstream in Newsome Creek and the S.F. Clearwater River, Idaho. It is estimated that 300 cubic yards are delivered to the stream annually resulting in 60% cobble embeddedness. In 1884, the US Forest Service began sediment abatement using small sediment traps, terracing, fencing, and planting shrubs and grasses to control sediment yield. Existing sediment traps filled rapidly and off-site disposal of the material has reached its capacity. Therefore, it is necessary to develop an on-site, timber structured 15,000 cubic yard impoundment estimated to prevent delivery for the next 50 years while revegetation of the mine slopes continues. The proposal is divided into 3 phases which are to be completed in 1996 & 1997. Planning and NEPA were previously done by the USFS. Newsome Creek has previously received habitat improvements downstream of the Gloryhole funded by both USFS and BPA dollars. The current Northwest Power Planning Fish & Wildlife Program, NPPC 94-55 , Section 7, Coordinated Salmon Habitat Production, subsections 7.6, 7.7, and 7.8 sponsor this activity. The BPA project number is 9303600. Nez Perce Tribal Hatchery, 1987 Northwest Power Act, Section 703, (1), (2) selected this stream as a treatment system for supplementation. In 1998-99, a satellite production facilitywill be built two' miles downstream from the Gloryhole. These actions coordinate a Columbia basin wide effort to recover and restore anadromous fisheries. Newsome Creek is a component of the natural production plan under the Tribal Recovery Plan. While this stream is not considered critical habitat for ESA, its production contributes to the overall salmon populations of the Columbia Basin. The USFS management actions in this area follow guidelines under PACFISH and tile biological opinions with NMFS in regard to ESA. The Americore, Salmon Corps youth program, will provide labor for this project. The USFS has monitored various stream components for a number of years, and will continue to do so in addition to monitoring other parameters as a result of the 1996 flood. These include: establishing a suspended sediment (ISCO) recorder in 1996, monitoring water'temperatures since 1990 (thermograph) monitoring stream substrate conditions (RASI, cobble embeddedness) in 1988, 1990, 1992, 1992, 1995 and 1996, and fish habitat surveys in 1994. Photo points will be used to track progress of sediment abatement and revegetation of the placer mine.

9303701

Technical Assistance With the Life Cycle Model

SPONSOR/CONTRACTOR:
Charlie Paulsen, Charlie Paulsen (503/245-8186)

GROUP:
Anadromous Fish

ABSTRACT:
Work under the project consists of data collection, analysis, and publication relating to population viability of Snake and mid-Columbia chinook and steelhead stocks already listed under ESA, or that are candidates for listing. Analyses under this project were designed to respond to Sections 3.2,4.3,5.OA, and 7.lE of the 1994 program.

In cooperation with PATH participants, we have identified hypotheses to be tested with existing data, and the need for design of monitoring programs for recovery planning. These hypotheses are being tested with statistical models, with life cycle models modified as needed. Peer review of project work over the past year has been very positive.

Analyses conducted under this project have examined differences in stock indicators across space and time (upriver-downriver stocks over 30+ years), and have integrated stock responses to climatic indices, habitat stressors, and hydrosystem development and operation. They show that different stock groupings (mid-Columbia, Snake spring, Snake summer, and lower-river spring chinook) have substantially different trends in abundance and survival. They also indicate that different stock groups are affected differently by both terrestrial and ocean climate, and by hydro development and operation.

Due to data limitations, not all potential stressors can be assessed. The stressors analyzed include the following:

1. Spawning and rearing habitat conditions, including hatchery releases, land use, and subjective habitat evaluations by regional biologists;
2. Climatic effects during freshwater and early oceanrearing;
3. Downstream migratory corridor indices;
4. Harvest levels.

These should help in assessing the likely improvements in survival that might be expected from a variety of projects. As land use and other habitat data are incorporated into the statistically-based life cycle models, the models could be used to assess the range of improvements that could be expected from habitat improvement and other program measures.

Work completed or underway for FY97 includes:

1. Upstream/downstream spring/summer chinook correlation analysis. Product: peer-reviewed reports for submission as journal article.
2. Data collection and retrospective analyses of Snake and mid-Columbia spring and-summer chinook; Product: peer-reviewed reports for submission as journal article(s).
3. Model design and assistance with data collection for Snake, mid-Columbia, and lower Columbia

(Bonneville-McNary) steelhead. Product: Draft report on model design considerations specific to steelhead life-cycle.
4. Participation in PATH workshops and review processes.

Work planned for FY98 includes:

1. Spring-summer chinook: improve retrospective models of habitat, hatchery, and hydro effects as needed for decisions in each of area of concern to managers. Include these effects in population projections.
2. Fall chinook: develop models to assess the past effects of stressors on fall chinook (assumes that fall chinook run reconstruction is completed in FY97). Begin assessment of potential future effects of management actions on fall chinook (prospective analysis).
3. Steelhead: Complete model design; analyze past effects of stressors on steelhead. Begin analysis of, the effects of future management actions on steelhead
4. Participation in related working groups and review processes.

Work planned for FY99-FY00 includes continuation of life cycle model development to assist in the design and implementation of recovery strategies and adaptive management learning opportunities for

9303800

North Fork John Day Area Riparian Fencing

SPONSOR/CONTRACTOR;
John A. Sanchez, USFS (541/278-3819)

GROUP:
Anadromous Fish

ABSTRACT:
Stream surveys and monitoring programs on the NFJD Ranger District have documented high water temperatures, degraded stream bank and channel conditions, and overutilization of riparian vegetation associated with livestock grazing. In their evaluation of habitat improvement projects in the Grande Ronde and John Day basins prepared for BPA, Beschta et al. (1991) recommended that restoration of riparian vegetation should be the focus of habitat improvement projects. They concluded that riparian exclosure fencing was the most successful means of reducing grazing impacts and improving riparian habitat.

Since 1993 about 76 miles of seasonal electric livestock exclosure fences have been constructed to protect and restore about 60 miles of riparian habitat with funding from BPA. Monitoring results indicate that the fences were 98% effective in excluding livestoek. Seasonal electric fencing has several advantages over more permanent types of fencing. It is considerably less expensive to install and maintain. It is much more flexible in terms of the location and during of use. Fenced areas can more easily be expanded or reduced. When the area has adequately recovered, it can be removed, if necessary, and moved to another location. It has minimal visual impact. And, since it is only in place seasonally (except for the posts), it is less restrictive for access for other riparian uses such as recreation and wildlife, and there is less potential for injury to wildlife.

The major objective of the project is to improve habitat quality for anadromous and resident fish species by restoring riparian vegetation and riparian ecosystem function in areas impacted by livestock grazing. Specifically, this project is designed to:

1. Increase stream surface shade and reduce water temperatures;

2. Promote stream channel narrowing, deepening, and complexity;

3. Increase size, age class composition, distribution, and diversity of riparian plants, particularly shrubs.

Fifteenmile Creek Habitat Improvement

SPONSOR/CONTRACTOR;
Ray Hartlerode, ODFW (541/296-8026)

GROUP:
Anadromous Fish

ABSTRACT:
The Fifteenmile Creek Habitat Improvement Project is a project designed to provide improved fish habitat, increased habitat.diversity, increased stream shading, reduced water temperatures, reduced sedimentation, provide for unobstructed fish passage, and screen all irrigation withdrawals. In an effort to link off of the better fish habitat we took a top down approach starting a the forest boundary and working down stream. The goal of the project is to improve natural production of the eastern most run of wild winter steelhead in the Columbia River Basin. This is being accomplished in the Fifteenmile Creek Basin, under the Columbia River basin Fish and Wildlife program, Measure 704 (d) (1).

The project is funded by and through the Bonneville Power Administration. Cooperators in the habitat enhancement project include, 70 private landowners, USDA Forest Service, Wasco County Soil and Water Conservation District, Natural Resource Conservation Service, National Marine Fisheries Service, and the Confederated Tribes of Warm Springs Reservation of Oregon.

Fifteenmile Creek now has approximately 80 miles of riparian protection fencing protecting approximately 40 miles of stream. In addition, 5 miles of Fifieenmile Creek is not fenced, but is excluded from livestock grazing under lease agreements with private landowners. To date the Oregon Department of Fish and Wildlife has installed approximately 900 instream fish habitat structures within the Fifteenmile Creek Basin. The Fifteenmile Project has constructed and now maintains six fish passage structures. The project also installed and maintains approximately 100 rotary pump fish protection screens and six gravity diversion fish protection screens.

Stream temperature data is being collected at four locations in the basin. Photopoint documentation is also being collected at 41 established sites.

9304500

Buck Hollow Watershed Enhancement (ODFW)

SPONSOR/CONTRACTOR:
Ray Hartlerode, ODFW (503/296-8026)

GROUP:
Anadromous Fish

ABSTRACT:
The Buck Hollow Project is a voluntary, cooperative watershed improvement project aimed at restoring watershed health. This project considers all the resources in the watershed and takes a top-down approach. It treats both uplands and riparian areas beginning in the upper reaches of the watershed and continuing down toward the mouth. A balanced approach using both structural and vegetative improvements is making a clear difference in the watersheds.

The 126,000 acre Buck Hollow watershed has its headwaters near Shaniko. From there, the mainstem of Buck Hollow Creek runs north and west to its mouth just below Shearar's Falls. Home to a variety of wildlife and fish species, the primary species of concern is summer steelhead. Steelhead numbers in Buck Hollow and other lower Deschutes tributaries have been severely depressed in recent years. Development and Implementation of Conservation and Grazing Management Plans to reduce peak runoffs and associated erosion, improve water quality, fish and wildlife habitat, and watershed productivity are principal goals.

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9305600

Assessment of Captive Broodstock Tech

SPONSOR/CONTRACTOR:
Penny Swanson, NMFS (206/860-3282)

GROUP:
Anadromous Fish

ABSTRACT:
Captive rearing is an evolving strategy for recovering depleted salmon populations; it involves capturing wild juvenile salmon from natural streams, rearing them in captivity to adulthood, and then releasing them as adults back into their natal streams to spawn naturally. The conservation benefit of captive rearing is that it bypasses the typically high smolt-to-adult mortality experienced by wild populations. The success of captive rearing as a restoration strategy depends upon the ability of captively reared salmon to spawn and reproduce in natural streams. We compared the reproductive behavior of captively reared and wild coho salmon of similar sizes commingling in an experimental streamchannel. Wild males dominated captively reared males in the majority (86%) of spawning events. Both wild and captively reared females exhibited a preference for wild over captively reared males, although the interplay between male dominance and female mate choice was unclear. Wild females established nesting territories earlier and constructed more nests per individual than captively reared females, suggesting a competitive advantage for wild females, Nevertheless, captively reared coho salmon demonstrated the full range of behaviors shown by wild coho salmon and the ability to spawn naturally.

(Additional abstract from project 9305601, "Captive Broodstock Research: Studies on Age of Maturity, Olfactory Imprinting, and Controlling the Time of Spawning in Captively-reared Fish")

Physiology research within the Captive Broodstock Project focuses on three areas: 1) refining technology for controlling spawning time; 2) developing diets and growth regimes which minimize early male maturity; and 3) defining critical periods of olfactory imprinting for sockeye and chinook salmon. This research was initiated because of observed problems with asynchrony of maturation of male and female fish within a spawning season, and high rates of early male maturity in captively-reared chinook salmon. In addition, concern has been raised about the ability of captively-reared fish (either juveniles or adults) to home properly to their native streams to spawn.

One of the methods commonly used to control the timing of spawning is treatment of mature adult fish with gonadotropin-releasing hormone agonist (GnRHa). We have conducted extensive studies to determine the optimum mode of administration, timing of administration and dosage of GnRHa for induction of ovulation and spermiation in both coho and sockeye salmon. The results indicate that GnRHa administered to broodstock via either biodegradable or nonbiodegradable delivery devices, effectively advanced and synchronized maturation in broodstock without compromising quality of the gametes. Fish were treated as early as 5 weeks prior to their natural spawning time. This technology is now being utilized by current captive broodstock programs to overcome problems with delayed and asynchronous maturation in captively-reared fish.

Another problem encountered in captive broodstock programs has been asynchrony in the age of maturity of male and female fish. In captive-broodstock programs for recovery of depleted salmon

stocks, there is no intention to alter the natural variation in age of maturity of native stocks by genetic selection. However, extreme cases of asynchronous age of maturity between male and female fish, particularly in small populations of fish, reduces the number of possibilities for genetic crosses in a given spawning season. In captively- reared chinook salmon, rates of precocious male maturation as high as 80% have been reported. Therefore, we have initiated research on factors that affect the age of maturity in male chinook salmon. Previous studies in Atlantic salmon have indicated that the age of maturity is influenced by genetic and environmental factors (both abiotic and biotic factors). Among the biotic factors, growth rate and/or body fat levels at critical periods of development have been shown to influence the age of male maturity. The overall goal of our studies is to determine the role of growth rate and/or body fat levels on early maturation of male chinook salmon. In one study, spring chinook salmon were fed for 13 months one of five high protein (70%) diets containing 6,9, 14, 18 or 22% fat, and fed at a ration to maintain body growth (weight) similar among all groups. There was a significant positive correlation of whole body lipid levels over the course of the experiment and the percent of males maturing at 2 years of age. Maturing males exhibited higher growth rates and higher pituitary gonadotropin levels than nonmaturing fish, even at the early stages of spermatogenesis which were observed almost one year prior to full maturity. These data suggest that a critical period for initiation of maturation is the autumn of the year prior to spawning and that body fat levels may be one factor influencing the physiological "decision" to initiate maturation. Presently, we are investigating the effects of growth rate and body fat levels during this critical period on maturation of male chinook salmon. This information will be utilized to design diets and growth regimes which support smoltification but minimize maturation at 1 or 2 years of age.

During critical developmental periods, juvenile salmon imprint on odors associated with natal streams, and use retained odor memories to guide their homing migration. -Failure to imprint on appropriate streams may increase the level of straying. Most research to date on Pacific salmon has been limited to coho salmon, and has shown that a critical period for olfactory, imprinting is during smoltification. We have initiated studies to determine the critical periods of olfactory imprinting in species with more complex life-cycles such as sockeye and spring chinook salmon. This information will be used to design rearing and release strategies for captively-reared fish or their offspring which ensure that salmon imprint and home on native streams.

(Additional abstract from project 9305602, "The Effects of Captive Rearing on Gamete Viability and Progeny Traits in Coho Salmon")
A recent approach to protect weakened populations of salmonids has been to capture naturally-produced fry in freshwater streams and culture them to maturity. A key assumption of this tactic is that the reared fish will develop into reproductively competent adults. One component of such competency is, the capacity to produce viable, and in the case of eggs, suitably sized and nutritionally rich gametes, at an appropriate time. A group of coho collected as wild fry reached maturity in 1995 at the Lilliwdup Hatchery. These fish provided us with an opportunity to assess how captive-rearing affected gamete quality and progeny performance. Our approach was to compare the morphology, gamete, and progeny characteristics of these fish with wild coho originating from the same genetic population. We found that wild and captive-brood males had similar length/weight relationships and comparable spermatocrit values. Wild females, on the other hand, tended to be slimmer for a given length than captive brood individuals. Also, when size was held constant, wild females had higher fecundities although as body size rose, egg numbers increased at the same rate in both types of females. Reproductive effort averaged
20% for females regardless of their origin. Furthermore, female type did not affect egg size variation within a female which ranged from 2 to 7%; the percentage of 'dry matter present in eggs (39%) was

also similar. However, when size was held constant, captive brood females generally had larger eggs than wild fish. Dramatic color differences occurred in the nuptial patterns of the adults and their eggs. Wild coho of both sexes had more red on their lateral surfaces, the males strikingly so, and eggs produced from wild females were often a vivid scarlet red compared to the lighter orange of those originating from captive-brood fish. Gamete viability and progeny traits were compared by examining eggs, embryos and fry produced from three, 6 X 6 factorial crosses. No differences in fertility, mortality, or frequency of monstrosities were found. Eggs from both types of females affected the length and weight of their offspring in a similar fashion, i.e. their eggs apparentiy had similar nutritive qualities. Parental origin also had no affect on how rapidly yolk materials were utilized. Moreover, neither male or female origin influenced the KD values of their fry at emergence. Fry originating from wild females did, however, have more vivid color patterns and greater amounts of-strontium presentin the primordial core of their otoliths. This difference, in strontium concentration will make it possible to track the survival and distribution of fish produced from captive brood females and thus may be an important tool in future ecological studies designed to evaluate the success of this supplementation strategy.

WDFW - Washington Wildlife Mitigation Agreement

SPONSOR/CONTRACTOR:
Jenene Ratassepp, WDFW (360/753-1690)

GROUP:
Wildlife

ABSTRACT:
The Washington Department of Fish and Wildlife (WDFW) and the Bonneville Power Administration (BPA) entered into a Washington Wildlife Mitigation Agreement (DEMS79-93BP94146, dated April 1993). BPA fulfills the Agreement by making available $21,840,000 to WDFW to fund wildlife habitat mitigation projects. Since 1993, the projects listed below have begun to address the-adverse effects of the constructionof Bonneville, The Dalles, John Day, McNary, Chief Joseph, and Grand Coulee dams and their reservoirs on wildlife and wildlife habitat within the State of Washington. Through Fiscal Year 1996 BPA has incurred costs of $4,882,561 and has received 11,563 Habitat Units as mitigation credit for habitat protection and habitat improvements.

In October 1996 a Memorandum of Agreement (MOA) (Intergovernmental Contract Number 96B197789) was signed between BPA and WDFW. The MOA transfers the balance of WDFW funds ($16,957,439) to WDFW annually. On behalf of BPA, WDFW uses these funds for the protection, mitigation and enhancement of wildlife and wildlife habitat for the period Fiscal Year 1997 through Fiscal Year 2000. Once all the projects listed below have been implemented, BPA will receive an additional 32,940 Habitat Unit as mitigation credit (at a minimum).

As a result of the 1993 Mitigation Agreement and subsequent 1996 Memorandum of Agreement, BPA will receive a minimum of 44,503 Habitat Units mitigation credit for funding the protection, enhancement and maintenance of wildlife and/or wildlife habitat benefits on over 119,000 acres.

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Columbia River Terminal Fisheries Research Project

SPONSOR/CONTRACTOR:
Paul Hirose, ODFW and Marc Miller, WDFW, ODFW (503/657-2028)

GROUP:
Anadromous Fish

ABSTRACT:
In its 1993 Strategy for Salmon, the Northwest Power Planning Council recommended that terminal fishing sites be identified and developed to harvest abundant fish stocks while minimizing the incidental harvest of weak stocks. The Council called on the Bonneville Power Administration (BPA) to: "Fund a study to evaluate potential terminal fishery sites and opportunities. This study should include: general requirements for developing those sites (e.g., construction of acclimation/release facilities for hatchery smolts so that adult salmon would return to the area for harvest); the potential number of harvesters that might be accommodated; type of gear to be used; and other relevant information needed to determine the feasibility and magnitude of the program."

Beginning in 1993, BPA initiated the Columbia River Terminal Fisheries Project, a 1 O-year comprehensive program to investigate the feasibility of terminal fisheries in Youngs Bay and other sites in Oregon and Washington. Terminal fisheries are being explored as a means to increase the sport and commercial harvest of hatchery fish while providing greater protection of weak wild salmon stocks. . The project is being conducted in three distinct stages: an initial two-year research stage to investigate potential sites; a salmon stocks and methodologies; a second three-year stage of expansion in Youngs Bay and introduction into areas of greatest potential as shown from initial stage research; and a final five-year phase of establishment of terminal fisheries at full capacity at all acceptable sites.

The goal of the project is to determine the feasibility of creating and expanding terminal, known stock fisheries in the Columbia River Basin to allow harvest of strong anadromous salmonid stocks while providing greater protection to depressed fish stocks. This goal is to be accomplished by addressing nine defined project objectives, which include site selection, rearing and harvest capability, stock evaluation and suitability, and development feasibility and potential.

Results to date include seven sites selected for immediate further investigation with water quality monitoring, benthic invertebrate sampling, and test fishing being conducted at all seven sites. From project research information, three new sites (Tongue Point, Deep River, and Blind Slough) were. chosen for net-pen location and fish rearing experimentation using Youngs Bay as a control site. Salmon stocks utilized to date include coho, fall chinook and spring chinook. Fall 1996 retums of coho indicate high survival and successful terminal fishery harvest at each site. Estimates of feasibility and lower Columbia terminal fishery potential indicate a 'production' estimate of 57 million smolts from eight sites, generating a gain of $49 million to the West Coast economy.

Salmon River Anadromous Fish Passage Enhancement, Idaho

SPONSOR/CONTRACTOR:'
Ralph Swift, Lemhi and Custer Soil and. Water Conservation Districts (208/756-6322)

GROUP:
Anadromous Fish

ABSTRACT:
The Model Watershed Project was initiated by the Northwest Power Planning Council in 1992 to improve chinook salmon and steelhead habitat in the Lemhi, Pahsimeroi, and East Fork of the Salmon River watersheds. This habitat enhancement project is administered through Lemhi and Custer Soil and Water Conservation Districts and coordinated through the Model Watershed in association with the local advisory and technical committees, public entities, and various local, state and federal agencies. The goal of the project is to maintain, enhance, and restore anadromous and resident fish habitat while also achieving and maintaining a balance between resource protection and resource use on a holistic watershed management basis. Specific habitat goals, as outlined in the Model Watershed Plan, (1995) include increasing instream flows during critical migration periods, reduce the number of physical barriers hindering migration, develop new rearing and resting pools, establish riparian vegetation along critical areas, and reduce the sediment levels within the spawning gravels.

Specific work has identified fish passage problems and implement appropriate habitat enhancement and passage restoration projects. Potential projects include fishways, irrigation diversion headgates, improved water distribution, improved secondary channel habitat, streambank stabilization, irrigation system development, diversion siphon structures, portable fish screens and acquiring instream flow agreements as they relate to fish passage in the Salmon River Basin..

The project is coordinated through the Idaho Model Watershed Project Advisory and Technical Committee in conjunction with the IDFG screen program and the Bureau of Reclamation Water Conservation Program. Projects. will be 100% BPA funds for materials and cost shared at 50% on labor with the landowners.

Additionally, monitoring and evaluation will be conducted to access meeting project objectives. This work can only happen with the cooperation of local communities, Soil and Water Conservation Districts, private landowners, Natural Resources Conservation Service, Idaho Department of Fish and Game, Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Forest Service, Shoshone Bannock Tribes, National Marine Fisheries Service, and Bonneville Power Administration. For fiscal year 1998, we are requesting $90,000. The Model Watershed Project is well on its way to meeting the objectives outlined in the Model Watershed Plan for enhanced fish habitat in the Salmon River Basin while bringing local communities closer together.

Oregon Fish Screens Project

SPONSOR/CONTRACTOR:
Roy Elicker, ODFW (503/872-5252)

GROUP:
Anadromous Fish

ABSTRACT:
In 1995, Oregon Department of Fish and Wildlife (ODFW) contracted with Scott Irrigation Company of LaGrande, Oregon to inventory all irrigation diversion pump sites in the principal waters of the Grande Ronde Watershed of Northeast Oregon. Approximately. 170 of these sites were found to be equipped with irrigation pump screens that did not meet current National Marine Fisheries Service (NMFS) criteria for fish protection. The NMFS criteria that were not being met were usually 1) either having screen mesh openings that were too large, or 2) having excessive approach velocities (e.g., too little screen area).

This project in the amount of $239,456 was to purchase pump screens on the Grande Ronde system and to conduct a screen inventory of the John Day and Umatilla systems. A $179,45 1 contract was issued in March of 1997 to a Pendleton, Oregon pump supplier, Pendleton Grain Growers, to install pump screens in the Grande Ronde areas. Bids have been received for the inventory work in the other basins, work which should be completed by the end of 1987.

Monitoring and Evaluation of Lyons Ferry Hatchery Fall Chinook Above Lower Granite Dam

SPONSOR/CONTRACTOR:
Billy D. Amsberg, Nez Perce Tribe (208/476-7296)

GROUP:
Anadromous Fish

ABSTRACT:
This project is evaluating how effective supplementation of Lyons Ferry Hatchery yearling fall chinook salmon (Snake River stock) is in the recovery of the ESA listed. Snake River fall chinook. This is a cooperative project between the Nez Perce Tribe, U.S. Fish and Wildlife Service (USFWS), and Washington Department of Fish and Wildlife. The first two years (1996 and 1997) ofthisproject were funded through the USFWS Lower Snake River Compensation Plan. Supplementation of Lyons Ferry Hatchery fall chinook yearlings and monitoring and evaluation studies were initiated on the Snake River at the Pittsburg Landing acclimation facility constructed by the U.S. Army Corps of Engineers in 1996. During 1997, a second acclimation facility was constructed near Big Canyon Creek on the lower Clearwater River. A third acclimation facility at Captain Johns Rapid on the Snake River is scheduled to be constructed and be in operation to acclimate fall chinook in 1998. Capacity will be 150,000 at each facility for a total of 450,000 fall chinook. Results from the 1996 monitoring and evaluation of yearling fall chinook released at Pittsburg Landing were encouraging. Fish health assessments were favorable for fish releases, mortalities during the six week acclimation period were low, and survival rates from PIT tagged fish were higher than expected to the Snake and Columbia River dams. This monitoring and evaluation study will greatly increased our knowledge of movement patterns, travel times, and survival rates of supplemented yearling fall chinook through the Snake And Columbia River dams. Ultimately, adult returns over Lower Granite Dam and contribution of hatchery fish to natural production will be the most important aspect in evaluating supplementation success. Monitoring and evaluation of adults from supplementation over Lower Granite Dam and to the spawning areas will begin in the fall, 1997.

9401200

Kootenai River White Sturgeon - M&E

SPONSOR/CONTRACTOR:
Vaughn Paragamian, IDFG and Paul Anders, KTOI, IDFG/KTOI (503/230-506 1)

GROUP:
Resident Fish

ABSTRACT:
Data collected during 11 years of white sturgeon (Acipenser transmontanus) investigations on the Idaho portion of the Kootenai River, five years on the Montana portion and British Columbia, Canada, portions suggested very little spawning was occurring. Studies of white sturgeon spawning in the Columbia River system reported water temperatures of 14 to 17 C., suitable water depths of at least three meters (10 ft) and a discharge with velocities of at least 0.5 m/s (1.6 ft/s) over a substrate of bedrock, cobble or gravel were utilized for reproduction. Prior to completion of Libby Dam in 1972, the Kootenai River had suitable habitat for a self-sustaining population of white sturgeon. A sample of 185 adult sturgeon examined between 1977 and 1980 revealed 79% (144) of the 185 fish were 15 to 27 years old. Thus, the majority of this sample of 185 fish were hatched between the years 195 1 and 1965. Hydrographic records indicated these were wet years with better than average runoff. Historic pre-dam flows ranged from 1,699 to 2,832 m3/s (59,992 to 99,998 cfs) during the sturgeon spawning period. Peak flows of the Kootenai River after Libby Dam were generally in the 250 to 450 m3/s (8,828 to 15,890 cfs) range, but occasionally higher.

Based on the previously mentioned information and more, our experiment was to test flows and determine if white sturgeon would spawn. We collected 2 13 white sturgeon eggs in 1994 during an , experimental test flow that had a peak discharge of 632 m3/s (22 kcfs). The Bonneville Power Administration and U.S. Army Corps of Engineers provided 2.09 billion m3 (1.7 million acre feet [MAF]) of water from Lake Koocanusa to produce a peak discharge in the river at Bonners Ferry of 1,082 m3/s (38.2 kcfs) during the spring of 1995. In 1996,348 eggs were collected while discharge peaked at 1,397 m3/s (49.3 kcfs).

Although spawning of white sturgeon has been documented during the test flows, we have not recorded any evidence of larval survival. White sturgeon in the Kootenai river are not spawning in habitat thought typical for this species, slow water velocities and over silt and sand substrate. Suitable habitat can ben found 6 km further upstream. Thus, many questions are unresolved.

This presentation summarizes the movements and spawning behavior of white sturgeon in the Kootenai ‘River prior to and during these experimental discharge periods, capture of juvenile wild and hatchery white sturgeon and discussion several untested hypotheses that may effect recruitment.

Idaho Fish Screening Improvement (see new NPPC)

SPONSOR/CONTRACTOR:
Patrick Marcuson, IDFG (208/756-6022)

GROUP:
Anadromous Fish

ABSTRACT:
Idaho Department of Fish and Game (IDFG) installs screens across ditches and pump intakes to minimize fish mortality associated with irrigation practices. These installations are to bring irrigators in compliance with State and Idaho code. The Department currently maintains 250 screens in the Salmon River drainage. Since 1992, the Department has been replacing screens on gravity flow ditches to meet **the** criteria established by the National Marine Fisheries Service (NMFS). A total of 164 screens (1997) are now at the new criteria standard. Our inventory shows 28 unscreened ditches and 147 screens needing replacement in known chinook and sockeye salmon corridors. When tributaries are reconnected to the Salmon corridors, up to 165 more fish screens will be needed. This project was started as a high priority ESA effort to improve screens and anadromous fish passage in Idaho tributaries with threatened and endangered species impacts.

The objectives of IDFG's fish screen program are to: 1) minimize fish mortality associated with irrigation water withdrawals, both gravity and pump systems; 2) conserve in-stream water with controllable headgates, elimination of diversions, consolidation of diversions, and reduction of conveyance losses; 3) recapture tributary streams disconnected from anadromous fish corridors; 4) habitat restoration and protection associated with irrigation practices; and-5) removal of migrational barriers to anadromous fish.

Current status of work completed by Idaho's screen program include:

1. Maintenance of 250 screens
2. Reconstruction of 164 screens to NMFS criteria
3. Two diversions eliminated and replaced with wells and pumps
4. Eight diversions eliminated by consolidation of ditches
5. One diversion eliminated by conservation agreement
6. Two small fish ladder constructions
7. Installed protective fence around four potentially hazardous screens
8. Maintenance of 57.5 miles of road, 171 fence gates, 22 cattle guards, 43 bridges, and 155 culverts to access screen sites
9. Installed 39, modified five, and repaired nine flood damaged headgates to conserve water and protect fish
10. Modified ditches to reduce conveyance losses
11. Installed six fish friendly irrigation diversions acting as barriers to migratory fish and contributors to unstable river channels
12. Conducted surveys of types and numbers of pump intakes on the Lemhi and Clearwater rivers
13. Installed four intake screens on pumps
14. Twenty demolitions of old screens and associated components
15. Obtained easements, topographic surveys, designs, field inspections, coordination with cooperators,

permit requests, prepared bid packages for contracted work, and shop and equipment maintenance.

The screen program requires $1,500,000 Mitchell Act dollars and $l,000,000 Bonneville Power Administration (BPA) funds to operate, maintain, protect, and reconstruct 40-50 projects annually. Cooperators and evaluators include Model Watershed, irrigators and landowners, BPA, NMFS, Bureau of Land Management, National Resources Conservation Service, U.S. Forest Service, a technical work group, Columbia Basin Fish and Wildlife Authority, and local government agencies.

Idaho Model Watershed Habitat Projects

SPONSOR/CONTRACTOR:
Ralph Swift, Lemhi and Custer Soil and Water Conservation Districts (54 l/963-7 195)

GROUP:
Anadromous Fish

ABSTRACT:
The Model Watershed Project was initiated by the Northwest Power Planning Council in 1992 to improve chinook salmon and steelhead habitat in the Lemhi, Pahsimeroi, and East Fork of the Salmon River watersheds. This habitat enhancement project is administered through Lemhi and Custer Soil **and** Water Conservation Districts and coordinated through the Model Watershed in association with the local advisory and technical committees, public entities, and various local, state and federal agencies. The goal of the project is to maintain, enhance, and restore anadromous and resident fish habitat while also achieving and maintaining a balance between resource protection and resource use on a holistic watershed management basis. Specific habitat goals, as outlined in the Model-Watershed Plan, (1995) include increasing instream flows during critical migration periods, reduce **the** number of physical barriers hindering migration, develop new rearing and resting pools, establish riparian vegetation along critical areas, and reduce the sediment levels within the spawning gravels. Projects have included grazing management systems, fencing projects, streambank stabilization, riparian vegetation plantings, and instream structure work. Six and one half miles of stream and riparian habitat have been fenced on the Lemhi River, seven miles on the Pahsimeroi, and one mile in the East Fork. These projects include both riparian pasture and riparian exclosure systems, providing direct benefit to fish habitat by improving pool composition, stream shading, and reduction in sedimentation.

Current project activities include-the continuation of stream riparian habitat enhancement on the following reaches: the upper twenty-five miles of the Lemhi River; the lower twenty-five miles of the Pahsimeroi River; and the middle fifteen miles of the East Fork of the Salmon River. Most of this work involves grazing and irrigation management systems, fencing an stream bank stabilization on private lands on these stream segments. Additionally, monitoring **and** evaluation will be conducted to access meeting project objectives. This work can only happen with the cooperation of local communities, Soil and Water Conservation Districts, private landowners, Natural Resources Conservation Service, Idaho Department of Fish and Game, Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Forest Service, Shoshone Bannock Tribes, National Marine Fisheries Service, and Bonneville Power Administration. For fiscal year 1998, we are requesting $350,000. This is a significant increase from past years due to the growing interest from local landowners to implement habitat improvement projects while still maintaining current land uses. The Model Watershed Project is well on, its way to meeting the objectives outlined in the Model Watershed Plan, while bringing local communities closer together.

9401800

Washington Model Watershed Habitat Projects

SPONSOR/CONTRACTOR:
Angela Fields , Art Sunderland, Duane Battles, Conservation Districts (509/758-8012)

GROUP:
Anadromous Fish

ABSTRACT:
Asotin Creek Model Watershed Plan

Implementation of fish habitat structures for the Asotin Creek Model Watershed Plan began in the fall of 1996. The District continues to work with landowners throughout the Asotin Creek watershed to enhance fish habitat, reduce water temperatures, decrease erosion and sedimentation, enhance and re-establish riparian vegetation, and promote cooperation between landowners and resource agencies. The Plan has enabled us to work closely with landowners and resource agencies to implement projects within the watershed and to evaluate and monitor project effectiveness. The key to success of any watershed plan is support, education, and cooperation of local individuals and agencies.

Future funding and continued support for watershed plans will be crucial for project implementation. Landowner objectives, as well as agency acceptance, is the starting point for all fish habitat projects. Funding and landowner benefit from project implementation need to be identified and secured. We emphasize education by working with the area landowners and students to get them involved in the Model Watershed process. Their involvement and ownership is crucial for continued success.

Tucannon River Model Watershed Project

The Columbia Conservation District continues to work with and develop positive working relationships with landowners in the Tucannon Model Watershed to enhance watershed health and fish and wildlife habitats.

The watershed plan development and early action implementation has enabled us to work cooperatively and closely with landowners and resource agencies to implement projects within the watershed for resource enhancement.

The keys to the watershed plan success are cooperation with and between landowners and agencies, education, and support through technical and financial assistance.

Continued support, committed long term funding and lcoal coordination (watershed coordinators) will be critical for successful plan implementation. Landowner cooperation, agency recognition and acceptance of landowner objectives is the beginning point for successful implementation of fish habitat enhancement projects.

Pataha Creek Model Watershed

The Pataha Creek Model Watershed has been very active during the fall of 1996 into the spring of 1997 installing in-stream fish habitat projects, streambank protection projects and treating upland with conservation practices.

In the fall and winter of 1996, the Pomeroy Conservation District and Washington State Conservation Commission cost shared the following practices with BPA funds: bank stabilization, offsite watering facilities, tree planting, log weirs, tree planting, fascine installation, buffer strips, sediment basins, terraces, strip cropping, subsoiling, no-till seeding, etc.

9402600

Pacific Lamprey Research and Restoration Project

SPONSOR/CONTRACTOR:
Gary James, CTUIR (54 l/276-41 09)

GROUP:
Anadromous Fish

ABSTRACT:
A Pacific lamprey status report, which was completed in 1995, determined that Pacific lamprey populations were generally depressed and made recommendations for research and management to restore populations. The Pacific Lamprey Research Project was thus formed. It is a cooperative effort between CTUIR, CRITFC, and OSU with the goal to increase Pacific lamprey populations above Bonneville Dam. An initial objective of the project is to determine the past and current magnitude and location of Pacific lamprey populations in the Columbia River Basin. Factors limiting Pacific lamprey abundance and distribution will be identified and ultimately Pacific lamprey restoration plans will be developed and implemented for N.E.Oregon and S.E. monitored at several mainstem Columbia and Snake-River Dams. An attempt to access past and current tributary abundance estimates of Pacific lamprey is ongoing based on data searches, personal interviews and observations. Based on preliminary data, it appears that mainstem Pacific lamprey abundance in 1996 at Bonneville Dam is at a. critical low level when compared to escapement data collected from 1939 to 1969. All subbasins above Bonneville Dam, except the John Day and Deschutes subbasins have extremely depressed populations. In the John Day and Deschutes subbasins Pacific lamprey populations have seriously declined. Limiting factors believed to have had or still have significant impact on lamprey populations include mainstem and tributary passage impediments (both structural and water quality/quantity related), habitat loss and past chemical treatment to control rough fish in tributaries.

To better understand if migration of adult lamprey is impaired by hydroelectric projects, OSU is examining methods of tagging and resultant stress on tagged individuals. Continued studies will focus in the swimming performance of radio-tagged adult Pacific lampreys in comparison to untagged lampreys. In addition, future studies on the use of physiological indices of stress and exhaustion will be conduced to determine if fish passage facilities are perceived as stressful to adult lampreys and if metabolic cost of negotiating such fishways is excessive and therefore, impairing survival.

Collections and genetic analysis of juvenile and/or adult Pacific lamprey from various subbasin populations in 1997 will be the first step in determining the most suitable stock to restore and or enhancement.

A multi-agency lamprey technical work group has been formed to discuss and coordinate various issues/factor regarding lamprey research and restoration such as limitations on all Columbia Basin commercial harvest, use of artificial propagation, transplantation, etc.

Grande Ronde Model Watershed Habitat Projects

SPONSOR/CONTRACTOR:
Patty Perry, Grande Ronde Model Watershed Program (Blue Mtns.) (541/962-6590)

GROUP:
Anadromous Fish

ABSTRACT:
Project Background

With the imminent Endangered Species Act (ESA) listing of spring chinook salmon on the horizon, the Union County Commission and Wallowa Court determined that a grass-roots, locally based effort working to coordinate existing local, state, and federal programs could effectively maintain, enhance, and restore our watershed. Joining in this effort, the Northwest Power Planning Council selected the Grande Ronde basin as a model watershed for Oregon, and the Governor's office through the Strategic Water Management Group certified the piogram. Bonneville Power Administration provides the administrative funding.

Appointed in May 1992, the Grande Ronde Model Watershed Program Board of Directors (Board) represents a diverse group of interests with the common vision of a healthy watershed. Participants include stock-growers, farmers, tribes, environmentalists, elected officials, and public lands, community, forestry, and fish and wildlife representatives.

A watershed can be managed to:

Maintain and enhance natural aquatic biological diversity.
Enhance or protect threatened species populations.
A" A Maximize natural resource yields in wildlife, water, commodities, or human uses.
A" A Support the economic and social livelihood of a community.

With that understanding, the Board formulated a mission statement which incorporates many of these elements. It is to "develop and oversee the implementation, maintenance, and monitoring of coordinated resource management that will enhance the natural resources of the Grande Ronde basin." Although addressing multiple elements in watershed restoration is perhaps more difficult that pursuing a single purpose, the Board felt this approach essential.

The basin encompasses the Blue Mountain region of northeastern Oregon. It is approximately 13,689 km2 (5,265 mi2) in size and has 280 streams and rivers containing over 4,160 km (2,600 mi) of fisheries. Land ownership is approximately 65 percent public and-35 percent private. The basin supports numerous healthy populations of fish and wildlife, as well as the ESA-listed spring chinook salmon.

Initial Steps

An important first task was developing memorandums of understanding to create partnerships with local residents, state and federal agencies, tribes, and interest groups concerned with the management of

the Grande Ronde watershed. From there, stream survey data available from state and federal agencies were compiled into a Habitat Assessment. This assessment was peer reviewed and accepted by the Board. This provided a sound "starting point" to develop a plan and focus restoration activities.

A technical committee was formed consisting of biologists, hydrologists, a soil scientist, forester, and other resource specialists to advise and provide recommendations to the Board on planning direction, technical issues, and to review and evaluate project proposals for technical merit and adequacy. Local agency staffs, the tribes, and private individuals with technical expertise are playing a crucial, key role in the model watershed process by serving on this committee. Reviewing project proposals has become one of the main functions of the technical committee, and is an effective means for ensuring cooperation and coordination among agencies and the various projects and activities in the basin.

Model Watershed Action Plan

Next the Grande Ronde Model Watershed Operations-Action Plan was prepared. It serves as a basin-wide framework to identify priority (for spring chinook salmon) subwatersheds for more detailed planning. It incorporates information gathered from several prior planning documents as well as the Habitat Assessment. The plan includes restoration criteria to aid in the process of prioritizing project actions. Staff is continuing to develop detailed subwatershed plans and project actions, working with landowner groups and others as appropriate. Landowner participation in this process is completely voluntary.

Additionally, the model watershed program initiated the Grande Ronde Ecosystem Diagnosis and Treatment (GREDT) study. This was undertaken to provide technical information to the Board and technical committee in their effort to plan and implement watershed restoration activities. The study was motivated by a need for a science-based methodology that promotes effectiveness and accountability. The analysis focuses on spring chinook salmon, which serves as a diagnostic species in assessing the condition of the watershed for sustainability of its resources and related societal values. This study assumes that humans and their values are integral parts of an ecosystem and that human communities within the Grande Ronde basin desire a healthy watershed-one that can sustain natural resources as well as economic and social values for future generations.

An effectiveness monitoring strategy has been developed and will be incorporated in each subwatershed plan. On-going monitoring efforts will be identified, coordinated, and used to establish gaps that need to be addressed. Each project action also contains a monitoring component. Several projects include monitoring by local high school students.

The Grande Ronde Model Watershed Program serves as an educational forum for landowner groups through coordination with the Oregon Cattlemen's Association and local Soil and Water Conservation Districts. Additionally, the model watershed program is defining for itself a rol as facilitator of improved dialogue between local, state, tribes, and federal natural resource management agencies. The model is especially helpful in encouraging coordination on issues beyond normal jurisdictional boundaries, and creating cooperative and incentive-based ways to encourage private landowners to take part in restoration efforts.

Habitat Restoration Progress

The model watershed program has assisted in developing many project proposals for habitat restoration in the basin. These projects involve private landowners, schools., organizations, tribes, and local, state,

and federal government agencies. Funding has been recommended and secured for approximately 140 worthy, well-designed projects. The scope of these projects address factors such as:

Fish passage structures/irrigation diversion improvements.
Riparian and rangeland livestock management/off-stream water development.

* Sediment.
* Erosion reduction.
* Water qualityand quantity.
A" A * Fish habitat.
* Technical seminars addressing riparian grazing.
* Education.

Implementation of these projects is in various stages, with the majority of them completed. Funding for these projects is available through private landowners, Oregon Watershed Health Program (statelottery funds), Bonneville Power Administration, Bureau of Reclamation, and other state and federal agency programs, as well as private groups and organizations.

Long-term project planning is ongoing, creating an advantage in securing and utilizing habitat restoration funds as opportunities arise. Project proposals in priority subwatersheds are developed with the objective to address identified environmental conditions such as fish passage problems, substandard riparian conditions (i.e., streambank erosion, streambed sedimentation, altered channel morphology, loss of pools, and reduced habitat complexity), upland conditions producing sediment, poor water quality, and depleted flow conditions.

In conclusion, the Grande Ronde Model Watershed Program is an exciting and innovative experiment in citizen-based natural resource planning by coordinating among all entities involved in watershed activities in the basin and is charged with providing a model for other watershed basins to consider.

Considerations

It takes time to create partnerships and develop a strong basin council. Being based in local county government has been very positive and offered additional opportunities. A watershed council must allow for a diverse group of interests, local agendas, and perspectives.

Planning is vital before moving to projects. The key is a local-assessment of environmental conditions' in order to establish priorities driven by the local governments, agencies, tribes, and community. The time expended for this is also weIl utilized in developing local consensus and unity.

Realize project development is very time consuming, and many local entities must be involved and incorporated in the process. Implementation is a multi-year process, recognizing our actions today will make a difference in the quality of our environment 25-50 years from now.

The availability of administrative and technical assistance/support to the watershed council is a crucial component.

9403300

, Fish Passage Center

SPONSOR/CONTRACTOR:
Pam Kahut, PSMFC (503/650-5400)

GROUP:,
Anadromous Fish

ABSTRACT:
The Fish Passage Center (FPC) is comprised of a techncial staff of biologists, a hydrologist, a biometrician and computer data base specialists. The FPC acts as techncial staff to the state, federal and tribal fish managers. The FPC designs and oversees the implementation of the annual Smolt Monitoring Program. FPC staff maintains and mangages migration characteristics, hydrologic, hatchery release, gas trauma symptoms, dissolved gas and adult passage data bases. The FPC utilizes these data bases to conduct techncial analysis required by the state, federal and tribal fish managers to implement flow and spill passage operations in the mainstem Columbia and Snake rivers. These data are made available to the region through the maintenance of the FPC Home Page, and through the development and distribution of weekly and annual reports.

Assessing Summer/Fall Chinook Restoration in the Snake River Basin

SPONSOR/CONTRACTOR:
Bill Arnsberg, Nez Perce Tribe (208/476-7296)

GROUP:
Anadromous Fish .

ABSTRACT:
1997 is the fourth year of five year study to assess summer and fall chinook restoration potential in the upper Clearwater River and principal tributaries, lower Salmon, Grande Ronde, and Imnaha Rivers. Our study focuses on evaluating: 1) current spawning habitat quality and quantity, and 2) temperatures during the egg incubation and juvenile rearing period. Current habitat will then be used to identify potential chinook salmon stocks for restoration. A broodstock management plan for restoration, including a risk analysis to ESA listed stocks, will follow. Ongoing monitoring includes fall chinook aerial redd surveys and carcass collection on all study rivers. The fall chinook salmon in the lower Clear-water River, as in all study rivers, is part of the Snake River fall chinook ESU and is listed under the ESA. This study is also evaluating naturally produced fall chinook salmon emigration characteristics and survival in the lower Clearwater River, and comparing these elements to Lyons Ferry Hatchery fall chinook salmon releases beginning in 1997. Since the Snake River fall chinook was listed in 1992 under the ESA, unnaturally high augmentation flows from Dworshak Reservoir during the summer months may be effecting growth and smoitification during the first year of life and may be adversely affecting their survival. We propose to continue evaluating releases of Lyons Ferry Hatchery fall chinook subyearlings into the lower Clearwater River for at least five years to test emigration survival rates under a range of environmental conditions.

9403900

Wallowa Basin Project Planning - G. R. Model Watershed

SPONSOR/CONTRACTOR:
Don Bryson, Nez Perce Tribe (503/426-0119)

GROUP:
Anadromous Fish

ABSTRACT: *
Project planning and implementation of Grande Ronde Model Watershed Plan in Wallowa subbasin. Specific plans for Bear Creek, Lostine River, and Big and Little Sheep Creeks. Instream flow study specific to Lostine River.

*** Text taken from Short Description field in 1997 B**

Trout Creek Operation & Maintenance

SPONSOR/CONTRACTOR:
Ray Hartlerode, ODFW (503/296-8026)

GROUP:
Anadromous Fish

ABSTRACT:
The Trout Creek Habitat Improvement Project, funded by the Bonneville Power Administration (BPA), through the Northwest Power Planning Act, began in 1982. Trout Creek was one of the first stream systems in Central Oregon to become a part of the BPA funded habitat enhancement projects. Trout Creek heads in the Ochoco Mountains and generally flows westward through the communities of Ashwood and Willowdale, emptying into the Deschutes at about river mile 88. The Trout Creek watershed covers approximately 750 square miles, with about 140 miles of mainstem and tributaries. The goal of this project is to improve habitat for spawning and rearing summer steelhead and other native fish within the Trout Creek Basin. The project accomplishes this by working to increase habitat diversity within the stream, reducing late‘summer stream temperatures, and reducing sedimentation and erosion.

ODFW has worked closely with the Jefferson County Soil and Water Conservation District (JCSWCD) and Natural Resource Conservation Service (NRCS, formerly SCS) to contact landowners along Trout Creek and to develop riparian leases which allowed habitat work to be accomplished on private lands. In these leases, BPA through ODFW, has agreed to construct habitat improvements and maintain them for 15 years.

Implementation of habitat improvements occurred between 1986 and 1994. Currently ODFW has riparian leases with 24 landowners within the Trout Creek Basin. Work on land owned by these landowners has included approximately 132 miles of exclosure and riparian pasture fencing protecting over 70 miles of stream. Also installed was 4,764 fish habitat structures that included log and rock weirs, cull logs, rock deflectors, and habitat boulders. Other enhancement work included 20,953 feet of Juniper and rock bank stabilization work, the addition of 750 cubic yards of spawning gravel, and the development of 11 off stream livestock watering sites. Thirty-seven fish protection screens have been installed on irrigation pumps and diversions. The project funding currently addresses operation and maintenance of habitat improvements installed during the implementation phase.

Limited monitoring has been performed on the Trout Creek Project. This has included photo-point documentation, stream temperature monitoring, and macroinvertebrate sampling.

9404300

Lake Roosevelt Monitoring / Data Collection Program

SPONSOR/CONTRACTOR:
Keith Underwood, Spokane Tribe (509/258-7020)

GROUP:
Resident Fish

ABSTRACT:
The Lake Roosevelt Monitoring / Data Collection Program (Monitoring Program) is a joint project involving the Spokane Tribe of Indians, Colville Confederated Tribes and Washington Department of Fish and Wildlife. The purpose of the Monitoring Program is three fold: 1) monitor and evaluate the efficacy of various kokanee salmon and rainbow trout stocking activities; 2) develop a model that will predict the effects of hydro operations on primary, secondary and tertiary trophic levels; and 3) develop a fisheries management plan with recommendations for lake operations.. The Monitoring Program was initiated in 1988 to monitor and evaluate the success of stocking kokanee salmon and rainbow trout from two newly constructed hatcheries (Sherman Creek and Spokane Tribal Hatcheries). The effectiveness of stocking strategies have been evaluated through tagging studies; creel, electrofishing, and gillnet surveys; age, growth and diet analysis; and kokanee imprinting studies. Information collected by the Monitoring Program has been used to examine entrainment of kokanee salmon and rainbow trout; trends in the abundance of fish and their food; changes in size and age of angler harvested fish; and the effectiveness of chemical imprinting on kokanee salmon homing. In 1997, the scope of the Monitoring Program was expanded to include collection of additional data for development of a predictive model to estimate the effects of lake operations on-the fishery and other biota. The model will assist with the advancement of a fisheries management plan that will contain lake operation recommendations designed to maintain a viable fishery in Lake Roosevelt while still providing stream flows for anadromous fishes.

Lake Pend Oreille Fishery Recovery

SPONSOR/CONTRACTOR:
Melo Maiolie, IDFG (208/769-1414)

GROUP:
Resident Fish

ABSTRACT:
Lake Pend Oreille is Idaho's largest natural lake. It covers 93,000 acres and at one time provided one of Idaho's best fisheries. Over 1 million kokanee were harvested annually and rainbow trout up to the 37 pound world record were caught from this lake. The outflow from the lake was dammed by the U.S. Army Corps of Engineers (Corps) in 1952 with the construction of Albeni Falls Dam. Inflow to the lake was also dammed during the same year by Washington Water Power when they build the Cabinet Gorge Dam; a federally regulated project.

Kokanee, bull **trout,** and rainbow trout fisheries have all been impacted as a result of hydropower development. Kokanee harvest has declined from over 1 million fish annually to about 100,000 to 200,000 fish annually. The bull trout fishery has been closed due to declining abundance. Rainbow trout stocking has ceased and regulation changes have been made to limit the abundance of the large predatory fish since they no longer have a strong food base. Twenty three miles of the Pend Oreille River have almost no fishing because winter drawdowns limit the overwinter habitat for warm water fish.

Lake Pend Oreille water elevations were routinely lowered 11 feet each fall for power production and flood control. This fall drawdown eliminated most of the shoreline gravel usable for kokanee spawning. Our research indicated that a 4 foot higher winter elevation would provide an additional 2 million square feet of spawning area. The Corps, on the basis of a recommendation of the Northwest Power Planning Council, agree to hold the lake higher as an experimental test. The test involves keeping the lake 4 feet higher during the winter for three consecutive winters and then monitoring changes in kokanee abundance and spawning patterns for 5 years. This test began during the winter of 1996-97. Approximately one third of the kokanee spawners utilized the newly available gravel this year. The other two thirds returned to deep water spawning areas in the south end of the lake. Monitoring changes in fry abundance will begin during the summer of 1997.

Three additional studies have also begun. One will examine Mysis shrimp as a potential competitor with kokanee. Another will examine the potential for Eurasian milfoil to invade the lake and the study will recommend control measures. Lastly, the third. study will examine the role of bull-trout and rainbow trout and determine if they are over exploiting their food supply. Our intent is to find some other way to recover fish populations if the lake level test should fail.

We will also re-examine the Pend Oreille River during the third year of the project . Baseline data on fish species composition, abundance, **and** distribution, has already been collected. Our follow up studies will determine if the higher lake levels have helped warm water sportfish.

9404900

Kootenai River Ecosystem Improvements Study

SPONSOR/CONTRACTOR:
Diane Richards, Kootenai Tribe (208/267-3620)

GROUP:
Resident Fish

ABSTRACT:
The white sturgeon (Acipenser transmontanus) population in the Kootenai River was listed as endangered by the U.S. Fish and Wildlife Service on September 6, 1994, due to a decline in population size, lack of recruitment during the last two decades, and post-development habitat loss and degradation. History of development in the Kootenai River system during the past 50 years includes channelization and diking, impoundment (construction and operation of Libby Dam), artificial nutrification followed by pollution abatement, mining and industrial activities, and residential and recreational development. The interaction of these development activities appears to be responsible for the collapse of the Kootenai River ecosystem. The Kootenai River White Sturgeon Study and Conservation Aquaculture project was initiated in order to preserve the existing genetic variability of the white sturgeon population, begin rebuilding a healthy age class structure, and prevent extinction while measures are implemented to restore habitat conditions necessary for successful natural recruitment. A breeding plan developed by Dr. Harold Kincaid, and described in the Draft Recovery Plan, will be implemented to guide management in the systematic collection and spawning of wild adults before they are lost from the breeding population. The objectives of the breeding plan include measures to minimize potential detrimental effects of conventional stocking programs and reduce the risk of detrimental genetic effects commonly associated with intensive hatchery production. The Kootenai River Ecosystem Improvements Study was designed to take a holistic approach to ecosystem recovery by compiling a comprehensive baseline biological status report and coordinating the development of a feasibility model to identify remedial actions for future improvement of the Kootenai River drainage. Interagency coordination will ensure the assessment and integration of all available biological, chemical, and environmental information to be used in a basin wide adaptive approach to management of the system.

Salmon River Habitat O&M/Monitoring & Evaluation

SPONSOR/CONTRACTOR:
Mike Rowe, Shoshone-Bannock Tribes (208/238-3757)

GROUP:
Anadromous Fish

ABSTRACT:
The Salmon River Habitat Enhancement (SRHE) project was initiated by the Shoshone-Bannock Tribes in 1984 to improve chinook salmon and steelhead runs to traditional Tribal fishing areas to a level capable of sustaining fisheries. The goal of the SRHE project is to increase adult escapement back to the Salmon River by improving survival and increasing production of chinook salmon and steelhead. The SRHE project has sponsored major habitat enhancement projects in three systems: 1) Bear Valley Creek, 2) the Yankee Fork of the Salmon River, and 3) the East Fork of the Salmon River. In Bear Valley Creek, 2.5 km of new floodplain were created, reclaiming an area which was degraded from dredge mining in the 1950's. This eliminated a substantial source of fine sediment into the remaining 50 km of stream and-led to documented improvements in surface substrate, pool cover, and non-anadromous salmonid densities. In the Yankee Fork, 16 off-channel ponds in four pond series created by dredge mining in the drainage were connected to the mainstem Yankee Fork. This resulted in an additional 1.58 ha of available rearing habitat for salmonids, with documented greater use than in the adjacent stream. Projects in the East Fork consist of two subprojects: Herd Creek and Big Boulder Creek. Work in Herd Creek involves stream bank stabilization on private-land through the use of fencing, riparian planting, and grazing management. Work in Big Boulder Creek involves 1) removal of a small hydroelectric dam providing access to 3.2 km and 7.7 km of previously blocked spawning and rearing habitat, respectively, 2) stabilization of 0.5 km of stream channel in the upper reaches that removed a source of fine sediment to the system, with expected improvements in channel morphology, and 3) outplanting of adult steelhead to restore the historical run in Big Boulder Creek. Current project activities include 1) maintaining and improving enhancements in all areas, 2) monitoring and evaluation of physical and biological parameters at all enhancement sites, 3) development of the Yankee Fork ponds as a low-tech bioenhancement facility with the Salmon River Production Program (BPA project # 55- 14), 4) continued fencing and riparian plantings on Herd Creek to improve stream bank stability, 5) complete the revegetation of the floodplain and continue to outplant adult steelhead in Big Boulder Creek, 6) coordination and evaluation of land and water stewardship activities in the Salmon River basin, and 7) coordinate the planning, implementation, monitoring, and evaluation of new improvements and protections. The SRHE project works cooperatively with the Idaho Department of Fish and Game, the U.S. Forest Service, the U.S. Bureau of Land Management, the Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Lemhi and Custer Soil and Water Conservation Districts, other BPA and Tribal projects, and private landowners in the Salmon River basin to accomplish the goals of the project. Funding requested for FY 1998 is $28 1,000.

9405300

Bull Trout Assessment - Willamette/Mckenzie

SPONSOR/CONTRACTOR:
Jeff Ziller, ODFW (541/726-35 15)

GROUP:
Resident Fish

ABSTRACT:
Populations of bull trout (Salvelinus confluentus) in the McKenzie and Middle Fork Willamette River sub-basins were studied to determine their relative abundance, distribution, and habitat requirements. The mainstem McKenzie appeared to have the largest and most stable population. In one day, we observed 36 adults in eight pools in the mainstem McKenzie. The number of redds in Anderson and Olallie creeks, which are believed to provide all of the spawning habitat in the mainstem McKenzie sub-basin, increased slightly over the number in 1995. Six adult bull trout were implanted with radio transmitters, though one fish either was caught or shed its transmitter in late summer. The five remaining radiotagged fish have provided information on bull trout pre- and post-spawning behavior and on habitat use, especially in the lower McKenzie. At Trail Bridge Reservoir, a significant trapping effort failed to catch enough bull trout for a population estimate, though we found seven bull trout redds in the McKenzie River above Trail Bridge. The one bull trout radiotagged in Trail Bridge Reservoir was caught, shed its transmitter, or died of natural causes soon after surgery. The USFS transferred another 894 fry from Anderson Creek to Sweetwater Creek, a tributary to Trail Bridge Reservoir. With the 1,404 bull trout fry transferred to Sweetwater in previous years, these fry should greatly increase the future adult population in the reservoir. The trend of the bull trout population in the South Fork McKenzie is unknown. We counted a maximum of nine adult bull trout in one day in 1996, compared with 17 in 1995, and three-in 1994. We found no redds in the upper South Fork or in Roaring River, the suspected areas of spawning. Two adults were radiotagged; one was caught, shed its transmitter, or died of natural causes, while the other apparently returned to the reservoir without spawning. Despite extensive snorkeling and electrofishing efforts, we located no bull trout on the Middle Fork Willamette River.

In 1997, we will monitor relative abundance and distribution of bull trout in the McKenzie River sub-basin. We will also conduct necessary work to authorize transfer of McKenzie bull trout to the Middle Fork Willamette River including: 1) a risk assessment for the effect of a transfer to Middle Fork Willamette on Anderson Creek bull trout, 2) surveys to identify and prioritize specific release sites in the Middle Fork Willamette, 3) collection of baseline data for release sites (fish species composition and abundance) and, 4) finishing and distributing a bull trout re-introduction proposal to interested parties.

Bull Trout Studies in Central and NE Oregon

SPONSOR/CONTRACTOR:
Dave Buchanan, ODFW (541/737-7634)

GROUP:
Resident Fish

ABSTRACT:
This project was initiated and funded by BPA in late 1994. Matching cost-share funding from permanent positions and capital are also provided by ODFW, Confederated Tribes of Warm Springs Reservation and U.S. Forest Service. A Steering Committee with representatives of BPA, ODFW, Tribes, USFS, USFWS, PGE, PacifiCorp, and Native Fish Society meet annually to technically review the project.

A total of 46 bull trout populations have been non-lethally sampled for nuclear DNA analysis. Preliminary analysis have separated bull trout into four major groups: (1) western Oregon, western Washington, Hood and Deschutes; (2) Klamath; (3) northeastern Oregon and John Day; and (4) Flathead in Montana. We are currently conducting distribution and habitat use surveys on 15 streams with sympatric populations of brook trout and bull trout; conducting bull trout spawning surveys including multiple surveys on three selected streams; compiling a statewide status report of bull trout for Oregon; and determining relationships between stream temperatures, distribution, and bull trout life history.

9405900

Yakima Basin Environmental Education

SPONSOR/CONTRACTOR:
Julie Bradley, Yakima Education Service District (509/575-2885)

GROUP:
Anadromous Fish

ABSTRACT:
This program offers teachers throughout the Yakima valley the opportunity to become involved with their students in real life projects to protect, enhance, analyze, and provide solutions to resource problems in their community. More than 100 teachers throughout the region have been trained and annually over 1500 students are involved in hands-on activities related to understanding and being active in better stewardship of our watershed.

The teachers receive training in a wide range of issues including salmon life cycle, stream hydrology, wetlands, riparian habitat functions, water quality monitoring, and understanding water needs. Teachers replicate these lessons and field trips with their students, involving them in real hands-on activities that provide relevant interdisciplinary curriculum.

Kalispel Tribe Resident Fish

SPONSOR/CONTRACTOR:
Joe Maroney, Kalispel Tribe of Indians (509/445- 1147)

GROUP:
Resident Fish

ABSTRACT:
Aboriginally and historically the Kalispel relied heavily upon anadromous salmonid fish from the upper Columbia River and its major tributaries. Per capita consumption estimates of anadromous fish for the Kalispel range from 100 lbs to 658 lbs annually. With the construction of Grand Coulee Dam, all migration of anadromous stocks were precluded from the upper Columbia River system, removing this resource from Kalispel exploitation. Resident fisheries were at-least as, if not more, important to the Kalispel as their anadromous fishery. Ethnographic data indicates that the Kalispel had an elaborate technology used for the exploitation of resident fishery resources. The subsequent construction of Box Canyon and Albeni Falls Dams in the 1950's furthered the decline in the fishery by causing a shift in the populations from predominantly trout, char and whitefish to predominantly squawfish and suckers. The dams have changed the habitat in this reach from that of a cold water fast flowing river to a warm shallow reservoir unsuitable for the native salmonids once contained in this reach.

In an attempt to partially mitigate for the resident and anadromous fish losses caused by hydropower development and operation, the Northwest Power Planning Council (NWPPC) called for recommendations to develop a program that would provide measures to protect, mitigate and enhance fish and wildlife affected by the construction and operation of hydroelectric facilities located on the Columbia River and its tributaries. The Kalispel Tribe, in conjunction with the Upper Columbia United Tribes (UCUT) Fisheries Center, undertook a three year assessment of the fishery opportunities in the Pend Oreille River to provide the NWPPC with their recommendations. These recommendations were adopted and incorporated into the 1994 resident fish and wildlife section of the NWPPC's Columbia River Basin Fish and Wildlife Program.

In 1995 the Kalispel Natural Resource Department (KNRD) and the Washington Department of Fish and Wildlife (WDFW) began the development of the Kalispel Resident Fish Project. Biological objectives were developed for the reservoir and tributaries that were subsequently adopted into the, NWPPC's program during the 1995 amendment cycle. These objectives will be addressed through habitat improvement recommendations and supplementation. Monitoring and evaluation of the prescribed enhancement measures will judge their scientific merit and gauge their success at meeting the biological objectives.

Due to the alteration of the reservoir habitat conditions created by the dams and in keeping with the KNRD Fish and Wildlife Management Plan to manage for as much harvestable biomass as was historically present, the project has developed separate strategies for the reservoir and the tributaries. These strategies are not conflicting as the target species for the tributaries do not occupy the same portion of the reservoir as its target species.

Phase one is a habitat and population enhancement pilot study for bull trout (Salvelinus confluentus) and westslope cutthroat trout (Oncorhynchus clarki lewisi) in the tributaries to the Box canyon reservoir

of the Pend Oreille River. Habitat and population assessments were conducted in seven tributaries of the Box Canyon Reservoir. Assessments were used to determine the types and quality of habitat that are limiting to native bull trout and cutthroat trout populations. Analysis of the habitat data indicated high rates of sediment, absence of active large woody debris, limited future large woody debris recruitment and a lack of wintering habitat. Population assessments were used to determine species presence, population numbers and the effects of interspecific competition between native and non-native species within these tributaries. Population data suggested that brook trout (Salvelinus fontinalis) have less stringent habitat requirements; therefore, they have the potential to outcompete native salmonids in limited high quality habitat. To determine the extent of hybridization, a bull trout and brook trout hybridization assessment was conducted. No hybrids were found among the samples, which is most likely attributable to the small population of bull trout available to hybridization within the Box Canyon Reservoir and associated tributaries. The principle factor threatening bull trout and westslope cutthroat trout is hybridization and interspecific competition with introduced salmonids. The data collected from the assessments were compiled and analyzed to develop recommendations for enhancement measures in the tributaries of the Box Canyon Reservoir. Recommendations for enhancement include upland and riparian planting, cattle exclusion fencing, instream structures and the removal of brook trout from an isolated reach of Cee Cee Ah Creek to preclude brook trout re-introduction. Phase two is a habitat and population enhancement program and study for an already naturalized largemouth bass (Micropterus salmoides) population in the reservoir. Previous studies have shown the altered reservoir habitat to be better suited to warm water species such as largemouth bass; however, the low overwinter survival of juvenile bass has been the limiting factor to their population. To address this recruitment loss, bass will be reared in the Kalispel Tribal Hatchery to a size larger the critical mortality size for the population and then supplemented into the reservoir. In conjunction with this effort, a bass habitat utilization study will be conducted to determine what type(s) and placement of structure provide the best survival rates. A monitoring and evaluation program will determine which structures will be used on a larger scale throughout the reservoir upon completion of the study. The placement of the structures along with supplementation will increase the harvestable population throughout the reservoir.

Libby Reservoir Mitigation Plan

SPONSOR/CONTRACTOR:
Brian Marotz, MDFWP/CSKT (406/75 l-4546)

GROUP:
Resident Fish

ABSTRACT:
Public involvement and support for fisheries mitigation projects is integral to the long-term success of these efforts. Montana Fish, Wildlife and Parks (MFWP) has quantified native fisheries (westslope cutthroat, bull and inland rainbow trout, burbot and white sturgeon) losses caused by construction and operation of Libby Dam. In response to these data, MFWP are drafting a mitigation plan designed to enhance and reclaim native fisheries populations in the Kootenai Basin primarily through habitat enhancement projects. This Implementation Plan will undergo one more series of public‘scoping meetings before being submitted to the Northwest Power Planning Council in 1997. In an effort to garner public support, MFWP will complete 3-4 high profile habitat projects. Sequential steps, including pre and post-treatment data will be documented and professionally compiled into an educational video. Videos detailing the benefits of habitat enhancement projects to native fish populations in the Kootenai Basin will be distributed to schools, shown at public meetings and distributed to resource management agencies.

SBT/SPT Joint Culture Facility

SPONSOR/CONTRACTOR:
David Arthraud, Shoshone-Bannock Tribes (208/238-3761)

GROUP:
Resident Fish

ABSTRACT:
A facility is planned to provide trout for the Duck Valley arid Fort Hall Reservations as part of the resident fish substitution and mitigation portions of the program. Fish are needed to help recover native populations of cutthroat trout on the Fort Hall Reservation and redband trout on the Duck Valley Reservation, and to provide isolated/enclosed catchable rainbow trout fisheries for economic development on the Duck Valley and Fort Hall reservations. In addition, put and take fisheries will relieve fishing pressure on native cutthroat and redband trout populations. In 1992, a feasibility study was completed by CH2M Hill indicating the best (most feasible) sites for the hatchery facility. In 1995 the hatchery master plan was completed by Montgomery Watson. Phase I is nearly complete: project locations have been reviewed and a site has been selected and is currently in the process of being purchased and constructed/restored. Phase II of the project involves collection of tissue samples from local populations of native fish to assess genetic purity. Adult fish or gametes will then be obtained from genetically pure populations and used as brood stock for the hatchery. Experiments will be conducted related to holding and spawning native cutthroat and redband to prepare for phase III implementation. Every year brood stock would be replaced with wild fish or gametes at a rate of 20 - 30%. Under phase III of the project adult cutthroat and redband brood stock will be spawned in the hatchery to provide eggs, fingerlings, and catchable trout for Duck Valley and Fort Hall Reservations. Cutthroat brood stock (160) pairs will be spawned to annually provide 350,000 eggs for the Fort Hall Reservation. Green and eyed eggs will be outplanted to hatch-boxes. Redband (150 - 300 pairs) will be spawned to provide Duck Valley Reservation with 350,000 eggs, 245,000 fingerlings and 94,000 catchables. Also rainbow trout eggs will be purchased to provide 550,000 rainbow fingerlings and 82,000 catchable rainbows for enclosed fisheries on Duck Valley and Fort Hall Reservations.

Hood River Production Program - PGE O&M

SPONSOR/CONTRACTOR:
Gary Hacket, PGE (503/464-8005)

GROUP:
Anadromous Fish

ABSTRACT:
The Hood River Production Program (HRPP) is a fish supplementation project in the lower Columbia Basin funded by Bonneville Power Administration (BPA) and jointly implemented by the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) and the Oregon Department of Fish and Wildlife (ODFW). The primary goals of the HRPP are to (1) re-establish naturally sustaining spring chinook salmon using Deschutes stock in the Hood River subbasin, (2) rebuild naturally sustaining runs of summer and winter steelhead in the Hood River, (3) maintain the genetic characteristics of the population, and (4) contribute to tribal and non-tribal fisheries, ocean fisheries, and the Northwest Power Planning Council's (NPPC) goal of doubling salmon runs in the Columbia Basin.

In accepting the Hood River Production Master Plan, the NPPC recommended adopting a three-phased approach which included collecting three years of baseline information, project implementation and facilities construction and follow-up monitoring and evaluation studies. Comprehensive collection of data began in the Hood River subbasin in late, 199 1, including information on the life history and production of anadromous salmonid stocks returning to the Hood River subbasin. Information collected by the HRPP was used to prepare an environmental impact statement (EIS) evaluating the program's impact on the human environment.

In 1995, following three years of collecting baseline information, the HRPP moved into project implementation and facilities construction. Among other things, this phase of the project included utilizing Hood River native winter steelhead for hatchery broodstock and converting the spring chinook hatchery program from Carson to Deschutes stock and rearing them in Pelton Ladder. The spring chinook rearing program in Pelton Ladder was initiated after earlier studies by PGE biologists were able to show growth and survival advantages with ladder reared spring chinook. Winter steelhead broodstock development actually started in 1992 because of concerns for the availability of wild winter steelhead in the Hood River based on low returns back to the Powerdale Dam adult trap. Techniques such as matrix spawning, acclimation and volitional release of hatchery fish were to be used to improve survival and homing ability and to reduce residualism with wild juvenile salmonids. Also, HRPP is developing a habitat restoration plan to guide habitat projects in the Hood River subbasin.

A major component of HRPP is construction of facilities to handle broodstock development and changes in production. To date, renovations have been made to Pelton Ladder for rearing juvenile chinook, and an adult trap has been built to collect brood and gather M&E data at Powerdale Dam. Projected for construction within the next two years will be an adult holding, spawning and acclimation facility in the Hood River subbasin and expansion of isolation/incubation and rearing capability at Oak Springs Hatchery.

9500900

Lake Roosevelt Rainbow Trout Net Pens

SPONSOR/CONTRACTOR:
Gene Smith, Project Coordinator, LRDA (509/725-8416)

GROUP:
Resident Fish

ABSTRACT:
History: The Lake Roosevelt Development Association (LRDA) was formed by a group of volunteers whose goal was to enhance Lake Roosevelt as a viable sport fishery. Funds to maintain the net pens became hard to come by and volunteers were becoming burned out. The need for a coordinator to manage the operation became more apparent. LRDA applied for funding through proper channels and received a maintenance and operation grant in FY95. LRDA also'receives some grant money from WDFW and a large fish food allotment through their cooperative program. LRDA is currently operating 34 net pens on Lake Roosevelt with the release this year of approximately 550,000 10- 12 inch rainbows.

General Operation: LRDA operates with a coordinator and an average of 42 volunteers along the 150 mile stretch of shoreline.

Basic Calendar of Events: In September and October fish are transferred form the Spokane Tribal Hatchery to sites at Keller, Lincoln, Seven Bays, Two Rivers, and Hunters. The Sherman Creek Hatchery supplies fish to Hall Creek and Kettle Falls sites.
From September through June the fish are reared in 34 net pens at these seven sites. Volunteers feed the fish and help maintain the pens.

In early June the fish are released. During the summer the nets are pulled, cleaned, and stored. Repairs are made to the docks and nets in readiness for the fall transfer of fish. The fish are raised in the pens for approximately nine months.

Sites and production: FY97 Site, # of pens, Rbt
Keller, 4,60,547
Hunters, 4,60,865
'Seven Bays, 8, 121,120
Kettle Falls (W), 4,62,491
Kettle Falls (S), 4,30,108
Two Rivers, 4,61,154
Hall Creek, 4,60,078
Lincoln, 6,93,532
Totals, 34, 550,104

Statistical Support: The Lake Roosevelt Monitors determined that previous to the net pen operation approximately 300- 1,000 native rainbow were harvested, annually. Since the net pen program, the harvest has risen to nearly 140,000 rainbow per year. Ninety-five percent of the harvest has been net pen rainbows.

Other Cooperative Members: Spokane Tribe. of Indians, WDFW, BPA, Confederated Colville Tribe of Indians, Bureau of Reclamation, Corps of Engineers, Lake Roosevelt Forum, and many Chambers of Commerce.

9501100

Chief Joseph Kokanee Enhancement Project

SPONSOR/CONTRACTOR:
Kirk Truscott, Biologist, Colville Confederated Tribes (509/634-8845)

GROUP:
Resident Fish

ABSTRACT:
The construction of Grand Coulee and Chief Joseph Dams in 1939 and 1956 completely blocked the anadromous fishery above these Federal hydropower projects ("blocked Area"). The Confederated Tribes of the Colville Reservation have been working cooperatively with the Spokane Indian Tribe and the Washington Department of Fish and Wildlife in fisheries enhancement programs for Lake Roosevelt utilizing resident fish substitution, for anadromous fish losses (resident fish substitution). The Chief Joseph Kokanee enhancement Project is one such resident fish substitution project that is being implemented in the "blocked area". The project was amended into the Council's Fish and wildlife Program in the 1995 amendment process and began it's first year of operation in 1996. The goal of the Chief Joseph Kokanee Enhancement Project will be to protect and enhance the naturally producing kokanee populations above Chief Joseph and Grand Coulee Dam an effort to support tribal subsistence and non-tribal recreational sport fishery in the area above Chief Joseph and Grand Coulee Dams and to preserve a potential unique stock of kokanee. The status of the naturally producing kokanee populations is not well documented, however spawning populations have been recorded in at least eight different tributaries and in Lake Roosevelt proper. The primary objective of this project is to determine the current status of the naturally producing populations and examine potential limiting factors to the natural production component that have not been addressed in other enhancement projects in the "Blocked Area" and propose potential actions based on the research findings. Potential limiting factors and proposed research include:(1)determine specifically dam entrainment losses through Grand Coulee Dam, (2)adult spawner recruitment in 8 tributaries with historical spawning populations (population status), (3)egg to fry survival rates and (4)genetic status of the present populations. Research data has been collected during the 1996-97 field season and is currently being analyzed.

Nez Perce Trout Ponds

SPONSOR/CONTRACTOR:
Dave Statler, Nez Perce Tribe (208/476-7417)

GROUP:
Resident Fish

ABSTRACT:
The Nez Perce Trout Ponds project is funded by Bonneville Power Administration (BPA) pursuant to measures 10.8D. 1 and 10.8D2 of the Northwest Plower Planning Council's 1995 Resident Fish and Wildlife Amendments to the Columbia River Basin Fish and Wildlife Program. The purpose of the project is to provide additional consumptive resident fisheries to partially compensate for irretrievable losses of anadromous fisheries caused by the permanent migratory blockage at Dworshak Dam. Fishing has historically been central to the Nez Perce Tribe culture. Consumptive fishing opportunities for resident fish have become increasingly important to the Nez Perce Tribe due to the paucity of salmon harvest opportunities. Activities from June 1995 through December 1996 have included: Talmaks Reservoir renovation (drain system repair, silt removal, dam heightening, and silt retention pond construction); Mud Springs Dam spillway installation; rainbow trout stocking; surveying the Mud Springs fishery, and; potential new pond site identification. The Mud Springs ftshery survey, conducted from May through September, 1996, indicated an estimated-2,010 hours of effort were expended to harvest 2,335 trout, for a harvest rate of 1.2 fish per hour.

9501500

Billy Shaw Res Development

SPONSOR/CONTRACTOR:
Guy Dodson, Shoshone-Paiute Tribes (702/757-3211)

GROUP:
Resident Fish

ABSTRACT:
The new reservoir will decrease pressure on native fisheries in the Owyhee River as well as the two existing reservoirs. This will enhance the fishing opportunities on the reservation for both tribal members and non-tribal members. The new reservoir will enhance the native wildlife populations by increasing riparian habitat, enlarging areas for waterfowl, increasing areas for raptors to feed and providing additional habitat for migratory birds, resident and upland game birds.

The Billy Shaw Reservoir Project is a unique reservoir that may possibly turn into the only redband trout catch and release reservoir known. This project will be an excellent test case for other tribes and agencies to see if redband trout can survive and reproduce in a lake environment. There is very little information on redband trout in Nevada and Idaho and once this project is underway intensive study will be conducted on the redband trout to determine survival rates, reproduction success, the success of catch and release on these fish, and many other factors involved with these weak but recoverable stocks of fish.

Should the tribes not be able to receive redband trout for initial stocking of the reservoir than another. option will be put in place. Possibly rainbow trout or some strain of rainbow trout. The species of fish to be stocked in this reservoir is still beingconsidered as to what species will be best suited to this high desert environment.

Genetic Inventory Westslope Cutthroat Trout

SPONSOR/CONTRACTOR:
Dave Statler, Nez Perce Tribe (208/476-7417)

GROUP:
Resident Fish

ABSTRACT:
Introgression by exotic trout has been identified as the greatest threat to the conservation of native westslope cutthroat trout in northern Idaho and western Montana. Genetically pure populations of westslope cutthroat trout are thought to remain in less than 4% of the historic range. Although the North Fork Clearwater drainage is considered a stronghold for westslope cutthroat trout populations in Idaho, rainbow and Yellowstone cutthroat trout are widely introduced in the drainage. Rainbow trout are present throughout the North Fork Clearwater River and into the major tributaries, potentially threatening the genetic integrity of wild westslope cutthroat trout in most of the drainage. Currently, Dworshak Resident Fish Mitigation releases rainbow trout into Dworshak Reservoir, the lower 86.2 km of the North Fork Clearwater River. These rainbow trout move considerable distances into the free-flowing portions of the drainage. To determine the extent of introgression in the North Fork Clearwater drainage, we will use non-coding sequences of nuclear DNA. Using the results of the genetic inventory, we will make management recommendations for mitigation in the drainage that is compatible with the persistence of native westslope cutthroat trout.

9502100

Okanogan Watershed Planning

SPONSOR/CONTRACTOR:
Gerald Marco, Colville Confederated Tribes (509/634-8845)

GROUP:
Anadromous Fish

ABSTRACT:
The Colville Confederated Tribes were funded initially to develop a habitat restoration plan for the Okanogan River and its tributaries. However, a separate water quality planning project already underway by the county public works department and the conservation district posed several concerns. 1) The public may have perceived two projects similar in make-up as competing or being in conflict, which would detract from both studies. 2) There may have been areas of overlap. Since the water quality study was already under contract and in progress, it made more sense to change the focus of the Tribes' study. This change of focus was agreed to in late March 1997 by BPA. The development of a watershed council to address habitat problems in the Okanogan will be delayed until the water quality study is completed. By that time any gaps in data collection can be identified, and a trans-boundary coordinated effort to address Okanogan River issues will be commenced. The Tribes' hope to build on the work completed in the water quality study.

Instead, the Colville Tribes are in the process of developing a cooperative planning project in the Salmon Creek watershed, which is a tributary of the Okanogan River. The USFS and the BLM, who each manage sizeable lands within the watershed, were already actively defining the problem and addressing solutions to blocked fish passage in Salmon Creek.

Presently the Okanogan Watershed Coordinator is working to convene a watershed council. She is meeting with local stakeholders to discern their levels of interest in participating in a cooperative approach to resolving blocked fish passage issues. In addition the coordinator is hiring a process facilitator to help the watershed council develop goals and objectives, a mission statement, a scope of work and a timeline for completion. The coordinator is also contacting agencies and local governments with management responsibilities in the Salmon Creek Watershed in order to assemble a technical advisory committee. The expectation is for a public meeting to be held in early July 1997 as a kickoff for the formation of the watershed council.

Flathead River Instream Flow Study

SPONSOR/CONTRACTOR:
Brian Marotz, MDFWP/CSKT (406/75 l-4546)

GROUP:
Resident Fish

ABSTRACT:
Construction of Hungry Horse Dam on the Flathead River (completed in 1952), caused many physical and biological changes in the Flathead River downstream. The dam created a complete barrier to migrating adfluvial fish species from Flathead Lake, that once spawned above the dam in the South Fork Flathead River. The barrier created by the dam is a mixed blessing because it now protects a rare native species assemblage from invasion by introduced species (eg. lake trout, eastern brook trout, northern pike and non-native forms of rainbow trout downstream. Hypolimnetic releases from the dam artificially cooled the river from 1952 through 1996 when a selective withdrawal structure was installed on the dam, allowing dam operators to control the water temperature in the tailwater. Now that the thermal pollution from Hungry Horse Dam can be mitigated, a primary manageable threat to watershed health is dam operation. Flow fluctuations from power and flood control operations create an extensive, low productivity varial zone, greater substrate imbeddedness and species shifts in the aquatic insect community which has become less diverse and less productive. A combination of man-caused factors resulted in the decline in native gamefish species (mountain whitefish, westslope cutthroat and bull trout) and a significant increase in abundance of non-game native species, the Columbia River chub or peamouth, northern squawfish and introduced rainbow trout. This project will use a modified form of the Instream Flow Incremental Methodology (IFIM) to examine the mechanisms by which dam operation effects the riverine community and their environment, and propose operational guidelines to mitigate negative effects. Results will expand the utility of the existing reservoir model HRMOD verify and refine the Integrated Rule Curves developed for Hungry Horse Dam. This project will be directly contracted by BPA through the competitive bid process.

9503300

O&M o.f Yakima Fish Protection, Mitigation & Enhancement Facilities

SPONSOR/CONTRACTOR:
Jim Faith, US BOR (509/575-5848.x215)

GROUP:
Anadromous Fish

ABSTRACT:
The Bureau of Reclamation (BR) Yakima Field Offtce provides O&M services for six Phase 2 fish screen sites. BR participates in the WA Fish Passage Technical Work Group, Value Engineering studies for Phase 2 screen projects, construction support, construction-to-operations turn-over inspections and reports. BR also provides input on facility operating procedures, criteria, and service procedures. We maintain a library and computer database containing all critical site information. BR maintains site security, log books, safety supplies and signing. Yakima Phase 2 is included in BR's Review of Operation & Maintenance Program. We also provide O&M and modification support for juvenile fish collection facilities and adult salmonid enumeration at Prosser and Roza Dams. BR's FY96 Phase 2 expenditure was $159K plus an additional allotment for Roza Adult Trap modifications. FY97 request is $19OK.

South Fork Snake/Sand Creek Wildlife Mitigation

SPONSOR/CONTRACTOR:
Jerome Hansen, IDFG (208/334-3098)

GROUP:
Wildlife

ABSTRACT:
Critical native riparian, wetland, and upland wildlife habitats have been impacted by many land use and development activities in southern Idaho, including hydroelectric development. Loss assessments and mitigation plans were completed by interagency teams of biologists in the late 1980's for Palisades, Minidoka, Anderson Ranch, and Black Canyon hydroelectric projects. In 1996, the Shoshone-Bannock Tribes and the Idaho Department of Fish and Game signed a cooperative agreement for the implementation of wildlife mitigation in southern Idaho. Under this agreement, the State and Tribes split mitigation responsibilities equitably, while working jointly on a number of mitigation projects in southern Idaho.

The Tribes and State are working together throughout southern Idaho to protect and enhance important native riparian, wetland, and upland wildlife habitats, benefit a number of target and non-target wildlife species, fish species, and achieve mitigation for Palisades, Minidoka, Anderson Ranch, and Black Canyon hydroelectric projects. Partners in this effort have included a variety of agencies and local governments and publics. Specific projects have included conservation easements, fee-title acquistion, and biological control of noxious weeds. Currently, efforts are being focused on the purchase of approximately 3,000 acres of big game winter range near the community of Soda Springs, Idaho. Surrounding approximately 4,000 acres of BLM land, in combination, these lands provide winter habitat for over 4,000 deer and 500 elk. They also possess important wetlands created by travertine springs and habitat for upland birds and raptors. Lands to be purchased would be managed by the BLM under a cooperative agreement. Examples of other projects include wetland and-upland protection activities in Camas Prairie and the Boise foothills.

Umatilla River Riparian Corridors: Squaw Creek Watershed Project (Anadromous Portion)

SPONSOR/CONTRACTOR:
Carl Scheeler, CTUIR (541/278-5268)

GROUP:
Anadromous Fish

ABSTRACT:
The Squaw Creek Watershed Restoration Project represents the most advanced state of evolution of the integrated natural resource management efforts for the CTUIR's Department of Natural Resources. This habitat based watershed approach to fish and wildlife restoration includes a project area of approximately 10,000 acres located entirely within the Squaw Creek subwatershed, a tributary of the Umatilla River.

The project entails acquiring fee title to approximately 7,500 acres of private land in the Blue Mountain foothills within the Umatilla Indian Reservation, inclusion of 750 acres of existing CTUIR Tribal Trust lands, and cooperative management agreements with fee land and individual Indian Trust land owners. Live stock use will be controlled through purchase of easements on range units administered by the Bureau of Indian Affairs. The project will permanently protect over eight miles of anadromous and resident fish spawning and rearing habitat and over eight thousand acres of terrestrial wildlife habitats. Project benefits will extend off project through contribution of quality water resources to downstream areas in the Umatilla River Basin which is currently considered water quality limited due to high water temperatures and nitrates.

The project was prioritized in FY 1996 for implementation under anadromous and wildlife funding. Pre-acquisition planning and implementation was conducted under FY 96 early implementation watershed dollars. Acquisitions, leases and landowner agreements will be finalized and enhancements initiated beginning in the summer of 1997.

The subwatershed contains a diversity of wildlife and native plant resources with critical habitat for elk and deer, suitable nesting and roosting habitat for the threatened northern bald eagle and other threatened, endangered and sensitive wildlife and plant species and habitat for HEP target species for the McNary and John Day Projects. Squaw Creek provides habitat for all species of anadromous fish in the Umatilla Basin including a significant spawning population of Umatilla River Basin steelhead, summer rearing for steelhead, Coho and Spring Chinook salmon and suitable habitat for redband and bull trout.

The project area is currently managed to maximize livestock and timber production which threatens the integrity of water resources, cultural resources, native riparian and upland communities and the associated fish and wildlife populations.

The project incorporates and builds on many past efforts aimed at restoration of fish and wildlife resources of the Umatilla Basin including fish habitat protection and enhancements, water quality monitoring, natural production monitoring and evaluation, in-stream/riparian habitat assessments, fish

passage and irrigation screening projects, in-stream flow augmentation, big game forage enhancements and Reservation land use planning.

The CTUIR Wildlife Program is currently in the process of facilitating the development of multi-agency plan to improve and promote the condition and distribution of native plant communities and cover/forage conditions for big game and other wildlife. Additional management activities in adjacent drainages on National Forest system lands include salvage timber harvest, prescribed underburning, and implementation of access and travel management plans. This project will ultimately be one component of a broader effort to develop and implement projects to improve natural ecosystems in the Blue Mountains. .

9506001

Umatilla River Riparian Corridors: Squaw Creek Watershed Project (Wildlife Portion)

SPONSOR/CONTRACTOR:
Carl Scheeler, CTUIR (541/278-5268)

GROUP:
W i l d l i f e

ABSTRACT:
The Squaw Creek Watershed Restoration Project represents the most advanced state of evolution of the integrated natural resource management efforts for the CTUIR's Department of Natural Resources. This habitat based watershed approach to fish and wildlife restoration includes a project area of approximately 10,000 acres located entirely within the Squaw Creek subwatershed, a tributary of the Umatilla River.

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9506300

Yakima/Klickitat Monitoring and Evaluation Program

SPONSOR/CONTRACTOR:
Melvin R. Sampson, BPA.(509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT: *
Monitor and evaluate the effectiveness of the Cle Elum spring chinook hatchery and other aspects of the Yakima Fisheries Project in enhancing the fishery for the Yakama Indian Nation and other harvesters through supplementation.

*** Text taken from Short Description field in 1997 B**

Refinement of Marking Methods for YKFP

SPONSOR/CONTRACTOR:
Bill Hopley, WDFW (360/902-2749)

GROUP:
Anadromous Fish

ABSTRACT:
Refinement of Marking Methods addresses resolvable uncertainties #26,27,29 and 3 1 and URP task #35: MARKMETHfin- 1. There are two primary tasks concerning benignly recoverable marking methods.

In the first task, short term biological costs and performance of seven different fish marking techniques were estimated. Eighteen groups of 1,100 fall chinook were otolith marked to treatment/replicate group as eyed eggs. In June, 1995, seven pairs of groups were marked with either CWTs, PIT tags, elastomer Visible Implant tags (VIT), Visible Photonic marks (VP), Invisible Photonic marks (IP), strontium chloride, or rubidium chloride. In addition, there were two pairs of control groups. The first controls (CU) were not handled during. the tagging process. The second controls (CH) were handled in the same manner as the'marked groups but no mark was applied. One month after marking two releases were made 21 km above the Bingham Creek weir and fish were then collected at the weir on a daily basis over the next 3 months. Mean tag retention 30 days post-marking was 99% CWTs, 93% IPs, 97% VPs, 75% VITs, and 99% PIT tags. Overall, mean relative survival for all groups differed by less than 10% from the CU groups except for the Rubidium and PIT tag groups which survived at 13 and 27% lower, respectively. However, PIT tags were the only treatment group with significantly lower survivals in both releases (chi-square test, =0.05). VP marks on average survived at 95% of the CU groups.

In a separate study on long term retention we marked 7 groups of coho (n=300 fish/group, mean length= 1 05mm) using visible photonic marks. Marks were applied to the anal fin, ventral fin and pectoral fin of each fish using one of 5 colors: red, orange, green, yellow and blue. Mark retention 28 days post-marking was greater than 97% for all groups. After 9 months post-marking, during which fish doubled in length, mark retention was less than 10% for New West Technology's material and between 87 and 96% for Northwest Marine Technology's (NMT) material. For NMTs material there was no significant difference in mark retention between body sites or between colors.

The second task deals with elemental marking of salmonid scales by immersion in either a strontium or rubidium chloride solution. We marked coho in 1994 with strontium chloride. Replicate treatment and control groups were CWT'ed and reared in marine net pens for the next 18 months. In October, 1995 coho were scale sampled, jaw tagged, and transferred to a freshwater net pen for a final month of rearing. Scales were again collected at the end of freshwater rearing. Paired samples of scale (Marine and Freshwater) were then analyzed and'compared to determine whether the strontium/calcium ratios of marked and control fish were stable over the entire lifetime of the fish through maturation. For FDA purposes we marked groups of juvenile fish with strontium and rubidium chloride and collected serial samples over time to determine when levels of the marking element had returned to normal background concentrations in edible tissue. Growth and mortality of marked and control fish were also monitored.

9506402

Upper Yakima Species Interaction Studies

SPONSOR/CONTRACTOR:
Bill Hopley, WDFW (360/902-2749)

GROUP:
Anadromous Fish

ABSTRACT:
The main goals of the Yakima Species Interactions Studies are to predict and monitor ecological interactions associated with supplementing anadromous salmonids in the Yakima River basin. In addition, this information is used to recommend strategic management actions to minimize undesirable ecological interactions. Initially, the greatest interactions concerns were related to the impacts that steelhead supplementation might have on the resident rainbow trout population, which provides the best wild trout fishery in Washington. Supplementation of anadromous salmonids may also impact other sensitive or highly valued non-target taxa such as bull trout, Pacific lamprey, and other stocks of salmon and steelhead. Ecological interactions that might impact non-target taxa of concern (NTTOC) include competition, predation, altered behavior, nutrient mining, and pathogens. Controlled field experiments indicate that steelhead supplementation will impact the resident rainbow trout population. In contrast, supplementation of spring chinook salmon will not significantly impact the resident rainbow trout population in tributaries. Ecological risk assessments for all NTTOC are currently being developed.

Characterization of NTTOC prior to, and monitoring during, supplementation will allow impacts to be detected and, if necessary, contained. Management objectives for NTTOC are being developed and will be the foundation for appropriate NTTOC status monitoring. The status of NTTOC will be determined by monitoring their distribution, abundance, and size structure. Impacts to rainbow trout abundance of 10% (relative to baseline abundance) can be detected with statistical certainty in three to five years following supplementation. Increasing understanding of the factors influencing variation (i.e., water flow, temperature) will decrease the time necessary to detect impacts.

Ecological interactions can also limit the success of the Yakima Fisheries Supplementation Project. For, instance, increases in the impacts of predators, competitors, or pathogens; or decreases in the impacts of mutualists, nutrients, or prey may limit the success of anadromous salmonid supplementation. Indices of predation, competition, pathogens, mutualists, and prey influence are being developed to identify ecological interactions that may limit supplementation success. An understanding of the important ecological interactions that occur between hatchery and wild fish/biota can result in strategic management actions that can minimize undesirable impacts on target and non-target taxa. Balancing the production benefits of hatchery supplementation, ecological risks to NTTOC, and knowledge gained through monitoring and evaluation will contribute to the management of productive and diverse ecosystems in the Yakima basin.

Policy/Technical Involvement and Planning for YKFP

SPONSOR/CONTRACTOR:
Bill Hopley, WDFW (360/902-2749)

GROUP:
Anadromous Fish

ABSTRACT: *
Provide for WDFW participation in all aspects of YKFP management in terms of policy and the impact of technical matters on policy.

9506800

Klickitat Passage/Habitat Preliminary Design

SPONSOR/CONTRACTOR:
Mel Sampson, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
The Klickitat River Project, initiated on August 10, 1995, is an integrated watershed analysis that will produce specifics that identify passage and habitat improvements. Over the last nineteen months the Yakama Nation Fisheries Program has conducted studies to evaluate the status of existing populations, carrying capacity and potential for enhancement to improve survival and production. The baseline information gathered will be utilized by the project modeling team to complete the species modeling necessary to determine the assumptions and uncertainties that will be the framework of the production and research objectives for the YKFP in the Klickitat basin.

Three YIN crews were formed: Fisheries Crew (FC), Habitat Crew (HC) and Population Monitoring Crew (PMC). The FC conducted steelhead, spring and fall chinook spawner surveys and snorkeling and electrofishing surveys in selected tributaries. The HC used Timber Fish Wildlife Ambient Monitoring protocol to conduct standardized habitat inventories to assess stream condition. Habitat inventories identified barriers to habitat that could provide increased production. The PMC began operating screw traps at two locations to determine current natural production levels and migration patterns for salmonids. These sites will be used for ongoing monitoring and evaluation of the YKFP. Sampling for bioassessment was conducted in seven mainstem locations and eight tributaries. Everson Environmental Consulting conducted a biological/chemical inventory at these sites using EPA Rapid Bioassessment protocol. Summit Technology of Seattle, Washington has completed a preliminary assessment of factors which limit adult passage at Lyle Falls no. 5 (RM 1 .O) and Castile Falls (RM 64.0 - 65.0). Included in the assessment is an attempt to define the passage problems, develop conceptual solutions to solve those problems, a preliminary cost estimate of the construction and program costs to correct passages deficiencies and develop adult trapping at Llye. All project data will be stored at the Pacific Northwest StreamNet Project.

Operation of the Independent Scientific Advisory Board

SPONSOR/CONTRACTOR:
Tom Giese; CBFWF (503/326-703 1)

GROUP:
Anadromous Fish

ABSTRACT:
The ISAB is jointly established- by the Northwest Power Planning Council (NPPC) and the National Marine Fisheries Service (NMFS). ISAB will provide independent scientific advice and recommendations regarding scientific and technical issues-posed by the respective agencies on matters related to their fish and wildlife programs. The NPPC has specified a series of tasks in its Fish and Wildlife Program of December 1994 (section 3.2), while NMFS has statutory obligations under the Endangered Species Act and other federal laws. The ISAB will address scientific and technical issues relating to the NPPC fish and wildlife program and the NMFS recovery program for Snake River salmon and other anadromous fish stocks, including related marine areas. It is understood that the interests of NMFS relate particularly to anadromous fish conservation and management, while those of NPPC include all fish and wildlife populations affected by operation and development of the hydroelectric system.

9600600

PATH - Facilitation, Tech Assistance & Peer Review

SPONSOR/CONTRACTOR:
Dave Marmorek, Essa Technologies Ltd. (604/733-2996

GROUP:
Anadromous Fish

ABSTRACT:
The Plan for Analyzing and Testing Hypotheses (PATH) is a formal and rigorous program of hypothesis formulation and testing intended to resolve uncertainties in the fundamental biological issues surrounding recovery of endangered spring/summer chinook, fall chinook, and steelhead stocks in the Columbia River Basin. This program grew out of previous efforts by various power regulatory agencies and state, federal, and tribal fisheries agencies to compare and enhance the models used to evaluate management options intended to enhance recovery of these stocks.

The objectives of PATH are to (1) Determine the overall level of support for key alternative hypotheses, and propose other hypotheses and/or model improvements that are more consistent with existing data; (2) Assess the ability to distinguish among competing hypotheses from future information, and advise institutions on research, monitoring and adaptive management experiments that would maximize learning; and (3) Advise regulatory agencies on management actions to restore endangered salmon stocks to self-sustaining levels of abundance.

PATH has developed a three level hypothesis framework as a logical structure for bounding the ecosystem components relevant to anadromous fish species and identifying and testing key hypotheses. Based on this structure, PATH completed a series of "retrospective" analyses for spring/summer chinook stocks in FY96 to identify the major spatial and temporal patterns in abundance, productivity, and survival of these stocks over the last 40 years and to determine the relative contribution of Habitat, Harvest, Hatchery, Hydro, and Climatic influences to these patterns. Reviews of the results of these analyses by an independent Scientific Review Panel (SRP) have been generally positive, and several analyses will be published in peer-reviewed scientific journals in 1997.

PATH work in FY97 is focussed on two key areas. First, we are attempting to evaluate the ability of management actions within each of the four areas of human activity (Habitat, Harvest, Hatchery, Hydro) to restore depressed spring/summer chinook salmon stocks. These "prospective" analyses are based on results of the retrospective analyses, and use a wide array of analytical methods and tools. Tools developed by PATH to date include a Bayesian life-cycle simulation model (BSM) to project the implications of management'actions in various life-stages on overall survival and abundance of salmon while considering the effects of uncertainty in salmon population dynamics. We have also developed several complementary decision-making frameworks, including formal decision analysis as recommended by the SRP and by independent scientists working within PATH. These frameworks help to organize and synthesize available information and data relevant to evaluation of management actions, and quantitatively'consider the effects of uncertainties in various components of the decision. PATH is also working closely with the ISAB to incorporate concepts from the "Return to the River" Report into our decision-making framework. The second major area of PATH activity in FY97 is the collection of data and development of retrospective hypotheses for fall chinook and steelhead stocks in the Columbia River Basin. Some of the challenges associated with conducting analyses of these stocks

include lack of data on recruitment and age structure, and diverse life histories and ecological requirements.

A preliminary decision analysis of spring/summer chinook, and retrospective analyses of fall chinook are expected to be completed by Fall 1997, with retrospective analyses of steelhead scheduled for completion in Spring 1998. PATH intends to provide an integrated decision analysis of management actions affecting spring/summer chinook, fall chinook, and steelhead by October 1998, together with specific recommendations on research, monitoring, and adaptive management.

9600700

Upper Salmon River Diversion Consolidation Program

SPONSOR/CONTRACTOR:
Mike Rowe, Shoshone-Bannock Tribes (208/238-3757)

GROUP:
Anadromous Fish

ABSTRACT:
The project is the consolidation three or four diversions (Pope, Minzer-Runsten, Kane-Ramey, and Edwards) into the Pope Ditch, resulting in elimination of two or three diversions from the Salmon River. In addition, enlargement of the Pope Ditch to carry an addition 13 cfs to irrigate approximately 550 acres from the Salmon City cemetary south, which is currently being irrigated from the Lemhi River. This would require the intallation of a "pump station" on the lower Pope Ditch. Salmon River water would only be "pumped" to replace the Lemhi River water during periods of critical fish passage needs on the Lemhi River as determined by the Idaho Department of Fish and Game and the Shoshone-Bannock Tribe biologists.

PATH - Participation by State and Tribal Agencies

SPONSOR/CONTRACTOR:
Howard Schaller, ODFW (503/872-53 10)

GROUP:
Anadromous Fish

ABSTRACT:
PATH is an iterative process of defining and testing a logical framework of hypotheses relating to the Columbia River anadromous salmon ecosystem. The framework is intended to provide guidance to the development of regional programs that would stabilize and eventually restore depressed salmon stocks to self-sustaining levels. It is also intended to provide a structure for an adaptive learning approach to development and implementation of recovery programs. PATH's objectives are to:

1. Determine the level of support for key hypotheses. based on existing information, and provide guidance to management agencies on the implications of these analyses for key management decisions [retrospective analyses]. Propose other hypotheses and/or model improvements that are more consistent with the data.

2. Assess the effects of alternative future management actions on salmon stocks, and the ability to distinguish among competing hypotheses from future information [prospective analyses]. Advise various institutions (NMFS, NPPC, BPA, USFW) on the consequences of alternative future management actions for salmon stocks, and the types of research, monitoring and adaptive management experiments which could maximize the rate of learning and clarify decisions.

Iteration within the PATH process occurs as this logical framework is revised over time in response to improvements in both information and analytical methods, and changing management questions. PATH is the first systematic effort in the Columbia Basin to link critical assumptions directly to decisions and data using advanced statistical and analytical approaches. The project is dependent on the continued regional commitment of the participation and cooperation of the technical expertise of ail the PATH participating fish agencies and federal hydrosystem operating agencies. By rigorously assessing the value of additional information from research studies, monitoring, and adaptive management experiments, PATH will provide a scientific basis for prioritizing expenditures for conserving and restoring these populations given limited financial resources.

In its first year of existence, with the guidance of independent scientists, some as peer reviewers, PATH has resulted in: clarification of management decisions with senior policy makers; development of hypotheses relevant to those decisions; detailed retrospective analyses related to hydrosystem, habitat and hatchery management decisions; and development of novel analytical tools to assist in decision making. Ongoing and planned projects for FY 97 and beyond include refinement and application of a prospective spring/summer chinook life-cycle model to estimate the overall survival rate improvements needed to achieve survival and recovery goals, use of the prospective stock performance model and decision tool to analyze the likelihood of alternative management scenarios to achieve those improvements, completion of fall chinook and. steelhead data acquisition and development of retrospective and prospective analyses for these species.

Continuation of the PATH contract will result in advice to various institutions on research, monitoring and adaptive management experiments. It will result in increased consensus among scientists and managers in different agencies on the state of knowledge, range of possible trajectories of endangered stocks, and appropriate management actions, and it will result in improved consolidation of decision support tools, and clearer links of these tools to empirical evidence.

Juvenile Fish Screens and Smolt Traps at Irrigation Diversion Dams on the Walla Walla and Touchet Rivers in Oregon and Washington

SPONSOR/CONTRACTOR:
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

ABSTRACT:
The Confederated Tribes of the Umatilla Indian Reservation are actively involved with the management of anadromous fishes in the Walla Walla River Basin. These efforts include projects that seek solutions to migrational obstacles for adult and juvenile fishes. Following are several passage projects initiated with BPA funding for construction in 1997 through 1999. CTUIR will work cooperatively with the Corps of Engineers on the Walla Walla River in the removal of Marie Dorian Dam and the modification of Nursery Bridge Dam. A new fish ladder, adult trap and juvenile screens will be constructed at Burlingame Dam, new screens, smolt bypass and trap and haul facility will be constructed at Little Walla Walla Diversion, and two temporary (push-up) dams (Garden City and Lowden 2) will be modified as part of a ditch consolidation project. On the Touchet River, a major tributary to the Walla Walla, Hofer's Dam will receive a full channel fishway, and CTUIR anticipates working cooperatively with Washington Department of Fish and Wildlife in the removal of Maiden Dam. It is expected that through these efforts, passage conditions for adult and juvenile salmonid fishes will improve and ultimately play a major role in achieving the salmon restoration and steelhead goals in the Walla Walla River Basin.

9601200

Adult Anadromous Fish Passage Improvement at Irrigation Diversion Dams on the Walla Walla River

SPONSOR/CONTRACTOR:
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

ABSTRACT:
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In-Season Operations Technical Management Team (TMT) Support

SPONSOR/CONTRACTOR:
PSMFC

GROUP:
Anadromous Fish

ABSTRACT: *
Provide administrative support to TMT process, including recording of meetings and implementation of Internet access to information used by and generated from TMT processes.

1997 Hatchery Pit Tag Study

SPONSOR/CONTRACTOR:
Charlie Petrosky, IDFG

GROUP:
Anadromous Fish

ABSTRACT:
The 1998 hatchery PIT tag study is the third year of a long-term program to develop estimates of smolt-to-adult survival rates for spring/summer (stream-type) chinook originating above Lower Granite Dam to evaluate the cumulative effect of smolt migration mitigation measures for the recovery of salmon stocks listed under ESA. The study compares the cumulative effects of smolt transportation versus cumulative effects of inriver migration measures and actions such as flow augmentation, spill and bypass. The objective of developing smolt-to-adult survival rate estimates is consistent with recommendations of the PATH (Plan for Analyzing and Testing Hypotheses) process being carried out by the regional state, federal and tribal salmon managers with the Northwest Power Planning Council (NPPC). The PATH recommendations address the question: "Can transportation of fish to below Bonneville Dam compensate for the effect of the hydropower system on juvenile survival rates of Snake River spring/summer chinook salmon during their downstream migration?" Objectives are:

(1) Continue a long-term index of transport survival rate (smolt-to-adult) to inriver survival rate (smolt-to-adult) for Snake River hatchery spring and summer chinook, measured at Lower Granite Dam;
(2) For Snake River basin hatchery stocks, continue a long-term index of survival rates from release of smolts at hatcheries to return of adults to hatcheries;
(3) Compute and compare overall smolt-to-adult survival rates for selected upriver and downriver spring/summer chinook hatchery stocks; and
(4) Continue a time series of smolt-to-adult survival rates for use in the PATH hypothesis testing process.

Objectives 1 and 2 address the question of survival rates of transported smolts relative to those of inriver migrants, to determine whether a significantly greater proportion of transported fish survive to return as adults to Lower Granite Dam and to the Snake River hatcheries. To compensate for the effects of the hydropower system on juvenile survival rates, the transportation program should return adults to the hatcheries and natal streams at rates sufftcient for persistence and recovery of the depressed stocks. Objectives 3 and 4 address the question of whether the transportation program compensates for the effects of the hydropower system through a comparative stock performance approach similar to that conducted through PATH for wild spring/summer chinook. In addition, the 1998 study will determine the feasibility of estimating smelt-to-adult returns for wild index stocks from the lower Columbia River (e.g., Warm Springs, John Day, and Klickitat rivers) for comparison with those from the Snake River.

This interagency study is a component of, and is coordinated through the Fish Passage Center's Smolt Monitoring Program. Approximately 104,000 hatchery fish were PIT-tagged in 1996 at Snake River and lower Columbia River hatcheries; in 1997 approximately 2 15,000 were tagged. Tagging leveis in 1998 are expected to be similar to those in 1997. The first jacks from the 1996 study will return in 1997. The study compliments ongoing mainstem research on transportation and reach survival by the

NMFS. Specifically, the study will be coordinated with NMFS' research to estimate reach survival and to estimate transport and in-river smolt-to-adult survival rates for run of the river fish. The 1997 study-proposal was reviewed and recommended for funding by the NPPC's Independent Scientific Advisory Board.

9602100

Gas Bubble Disease Monitoring anb Research of Juvenile Salmonids .

SPONSOR/CONTRACTOR:
Dr. Alec G. Maule, National Biological Service (509/538-2299)

GROUP:
Anadromous Fish

ABSTRACT:
The objectives of this study are to: 1) determine the significance of gas bubble disease (GBD) in juvenile salmonids migrating in the Snake and Columbia rivers, 2) determine an optimal method for detecting and assessing GBD in juvenile salmonids, 3) determine the vertical distribution of smolts migrating in water with high total dissolved gas, and 4) determine sublethal effects of exposure to gas supersaturated water on juvenile salmonids. In 1995 and 1996, relative few smolts examined at dams had any signs of GBD and those signs were generally of low severity. Beginning in 1997 responsibility for monitoring smolts at dams will be covered by the Smolt Monitoring Program; however, we will continue to provide training and QA/QC in conjunction with the Fish Passage Center.

In laboratory studies we found that fish exposed to 130% total dissolved gas (TDG) in shallow tanks developed emboli primarily in their lateral lines and gills and showed 50% mortality (LT50) in about 4-5 h. Fish exposed to 120%TDG showed a progressive worsening of GBD in their lateral lines and fins and had an LT50 of about 48 h. Fish exposed to 110% TDG mostly developed severely blistered fins but did not die even after 2 1 d. Our results indicate that GBD in juvenile salmonids progressively worsens in the lateral line and fins, but not necessarily in the gills, and also shows a high degree of individual variation. We emphasize that these data were derived under a worst case scenario in shallow tanks and that fish depth is an important variable in the TDG-GBD relation. Hydrostatic pressure of each meter of depth provides compensation for about 10% of supersaturation. A newly-developed miniature pressure-sensitive radio transmitter (tag) was evaluated and field tested in 1996 as a tool for determining the depths of individual juvenile salmonids. The tags were miniaturized without compromising accuracy, precision, or resolution. The depths of three fish tracked from boats during testing in 1996 were recorded at hourly intervals during their migration through the Ice Harbor-to-McNary reach of the Snake and Columbia rivers. The fish were detected as deep as 9.54 m with median depths ranging from 1.08 m to 4.27 m. Median TDG at the fish locations ranged from 119.8% to 125.8%. Hydrostatic pressure at the median fish depths reduced the median TDG experienced by the fish to between 82.4% and 107.4%. This may explain the difference between expected and observed signs of GBD if representative of large numbers of migrating juvenile salmonids. Approximately 200 juvenile salmonids will be tagged, released and tracked in 1997 and 1998. In 1997-98 we will complete laboratory studies on the progression and severity of GBD and begin studies on the interactions between gas supersaturated water and disease resistance. We are also proposing a study of the effects of gas supersaturated water on larval fish to begin in 1998.

Evaluating Effects of Dissolved Gases on Resident Fish

SPONSOR/CONTRACTOR:
Robert Iwamoto, NMFS (206/860-3270)

GROUP:
Anadromous Fish

ABSTRACT:
We sampled resident fish from sites with high levels-of total dissolved gas saturation (TDGS) in the middle and lower Columbia and lower Snake Rivers. All fish were examined to assess external signs of gas bubble disease (GBD). Subsamples were held for 4 days in pens secured at different depths (O-O.5 m, O-4 m, and 2-3 m) within the high TDGS areas. These samples were examined to evaluate TDGS and depth-compensation effects on mortality and the prevalence of external GBD signs. A mathematical equivalence to describe the effects of increasing, static, and decreasing exposure to TDGS was used to develop an exposure index (EI). We used a second order polynomial regression to develop a model for predicting GBD signs from TDGS exposure among sampled fish, and to assess mortality from GBD signs among fish held in pens. The exposure model produced a strong relationship (R2=0.79) with GBD signs, but the mortality model produced no clear correlation between external GBD signs in all fish species sampled and mortality. A preliminary mortality model using data from three of the resident fish species sampled (Mylochielus caurinus, Micropterus dolomieui, and Perca flavescens) yielded an R2 value of 0.39.

Changes in Gas Bubble Disease Signs and Survival of Migrating Juvenile Salmonids Experimentally Exposed to Supersaturated Gases

SPONSOR/CONTRACTOR:
Earl Dawley, NMFS (503/861-1853)

GROUP:
Anadromous Fish

ABSTRACT:
Groups of hatchery steelhead (Oncorhynchus mykiss) were PIT tagged and experimentally exposed to supersaturated dissolved gas and released along with control fish upstream from Little Goose Dam on the Snake River. Prevalence of gas bubble disease (GBD) signs among treatment fish averaged 37.6% at release. Treatment and control fish were recaptured in the juvenile fish bypass system at Little Goose Dam and changes in GBD signs were assessed and compared to changes in signs of fish held in a net-pen in the forebay of the dam. Of the recovered test and net-pen fish that displayed signs when released, about 47% and 22%, respectively, did not have signs when reexamined. Of the recovered test fish displaying GBD signs, the average severity of signs decreased. Fish with minor signs at release showed a slight increase in severity of signs when recovered, while fish with greater severity of signs at release showed a progressive decrease in severity. The percentage of fish that lost GBD signs varied directly with forebay total dissolved gas levels (moderately correlated). Of the fish displaying no signs at release, 5.9% of test, 3.8% of control, and 8.1% of net-pen fish showed signs when reexamined. No statistical differences in estimates of relative survival were observed from PIT-tag interrogations at Little Goose, Lower Monumental, Ice Harbor, and McNary Dams.

Hanford K-Basin Fall Chinook Acclimation and Master Plan Development

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
The Yakama Fisheries Resource Management Program has planned three supplementation projects for implementation at the U.S. Department of Energy site at Hanford. These projects are:

1. Annually rear from 700,090 to 5,000,000 upriver bright fall chinook salmon smolts in huge Hanford water purification pools and release directly into adjacent Columbia River to return to spawn naturally in the Hanford Reach.

2. Obtain appropriate wild white sturgeon broodstock and rear fry in Hanford K Pools until of a size to supplement non-recruiting Columbia River basin impoundments with genetically diverse juveniles.

3. Perform Pacific lamprey artificial propagation pilot projects to test adult production for a traditional food source or juvenile production for release to restore wild stocks,

The concept being used to guide implementation is 1) to establish "normative" (near-natural) rearing environments in the K Pool facilities to produce the highest quality juveniles and 2) to ensure genetic diversity by obtaining fall chinook salmon fry from only Hanford Reach upriver bright broodstock and propagating white sturgeon fry from a sufficiently large number of families.

The Master Plan is consistent with other Co-Manager Plans, which include:

1. NPPC 1994 Columbia River Basin Fish and Wildlife Program;
2. NPPC Independent Scientific Group's "Return to the River;"
3. Wy-Kan-Ush-Mi Wa-Kish-Wit Tribal Salmon Restoration Plan;
4. NMFS Biological Opinion Consultation Number 383;
5. Washington Department of Fish & Wildlife's "21st Century Wild."

The Master Plan is also being coordinated with other Fishery Agencies:

1. Annual K Pool fall chinook salmon smolt rearing and release program will be approved by the Production Advisory Committee under the Columbia River Fish Management Plan.

2. White sturgeon juvenile supplementation is being coordinated with Washington and Oregon fishery agencies.

9603301

Yakima River Fall Chinook Supplenientation

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
Two fall chinook sub-stocks have been identified as genetically unique through electrophoresis in the Yakima River basin. One genetic stock of fall chinook spawns naturally in Marion Drain, the other in the mainstem Yakima River. Adult redd counts for both sub-stocks have been declining over the past 10 years. In, FY' 96, the Yakama Indian Nation began an experimental supplementation program to ensure survival of these two important sub-stocks.

Marion Drain was constructed to return irrigation ovefflow and groundwater seepage to the Yakima River from agricultural lands located on the Yakama Indian Reservation. It has a large component of high quality groundwater influence along with Toppenish Creek water and irrigation overflow. This unique water has allowed the Marion Dram fall chinook to survive and will also provide an acceptable water source for adult holding and smolt acclimation. Ground water will be developed for egg incubation and early rearing.

Supplementation of the Marion-Drain sub-stock will occur by trapping adults returning to Marion Drain, spawning those adults, and acclimating and releasing the smolts at Zimmerman Ranch (RM14). Initially the Prosser Hatchery will be used for egg incubation, early rearing, adults holding and spawning. A complete hatchery will be developed beginning this year at Zimmerman Ranch to accommodate all phases of fish culture for the Marion Drain sub-stock. Facilities will be designed to ultimately spawn 60 females producing approximately 200,000 eggs and 160,080 smolts per year.

The other unique genetic stock resides in the mainstem Yakima River where the majority of spawning occurs below Prosser Dam from Mabton to the river mouth. This stock has been supplemented with out-of-basin upriver bright stock for several years. With expansion of the Prosser Tribal Hatchery, a facility will exist to allow the Yakama Nation to use locally adapted brood-stock from the lower Yakima River and fully propagate at this hatchery. Broodsotck will be trapped one mile from the hatchery at the Porsser Dam Adult Trap. The goal is to produce 2,000,000 lower Yakima River smolts annually.
A phased experimental approach is proposed to fully test both facilities and methods before large scale implementation of the program. Through implementation of this supplementation plan with a strong monitoring/evaluation component, fall chinook restoration will begin which will ensure survival of the Marion Drain sub-stock, enhancement of the lower Yakima River stock, and increase contributions to . tribal and non-tribal fisheries.

Yakima River Coho Restoration

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
Coho are second only to chinook salmon in abundance in the Columbia River Basin. Current abundance, centers in lower Columbia River tributaries. The longest distance coho are known to have migrated in the Columbia River was to the Spokane River, 700 miles from the ocean, Coho traveled 400-500 miles to reach spawning areas in the Yakima, Wenatchee, Entiat, and Methow river drainages.
Based on geographic distribution of known past and present habitat, 42% or 50,000-70,000 coho attributable to the upper Columbia River would have originated in the Yakima River drainage. Estimates for other upstream rivers are: Wenatchee, 6,000-7,000 coho; Entiat, 9,000- 13,000 coho; Methow, 23,000-3 1,000 coho.

Habitat degradation has occurred throughout the Yakima and Mid-Columbia subbasin as a result of agricultural practices, including grazing, irrigation and fluctuations in stream flow. Diversion dams were long ago constructed on small spawning tributaries . Dams were also constructed on larger tributaries for irrigation, power and flood control. These dams impacted passage of both adults and juveniles. Mainstem Columbia River dams have caused extreme impacts on juvenile and adult survival. Loss of riparian area from residential and recreational home development, channelization, and road construction continues to be a problem.

Coho have also suffered the additional impacts of extremely heavy harvest exploitation in ocean and lower Columbia River Fisheries. With the construction of Mitchell Act hatcheries in the 1960s and 197Os, harvest rates on the lower Columbia were designed to maximize harvest of lower mainstem hatchery stocks which could sustain high exploitation rates. During this period, harvest rates on Columbia River stocks often exceeded 90 percent effectively wiping out weak, natural upper Columbia River populations.

In addition to the habitat problems and high exploitation rates, fish production programs in the subbasin have been limited or nonexistent. While production programs have been planned since the adoption of the Power Council's Fish and Wildlife Program, to date, these programs have not been implemented. The Yakima Nation is proposing to restore through supplementation Yakima River and Mid-Columbia coho populations with early stock coho from lower river hatcheries in order to further natural production and harvest goals identified in the Yakama Nation's "Coho Salmon Species Plan for the Yakima River Basin" and "Coho Salmon Species plan for the Mid-Columbia River Basin" (CSSP). With this project, adult and/or juvenile coho from appropriate lower river hatcheries will be transferred to selected habitats or acclimation ponds in the Yakima River and/or Mid-Columbia tributaries. It is expected that transferred adults will spawn naturally in areas close to where they are released with the resulting production rearing in suitable production areas identified in the CSSP for about 17 months prior to out migration. Juvenile releases would rear for up to one year in suitable production areas, then return after ocean migration to these same areas to spawn. Pre-smolts will be acclimated for one month in low cost ponds prior to release.

The goal of the Yakama Nation CSSP is to restore coho salmon populations to levels of abundance and productivity in suitable natural habitats throughout the Yakima River Basin and Mid-Columbia sufficient to sustain annual harvest by tribal and other fishers.

Methow Valley Irrigation District Conversion

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
The Methow Valley Irrigation District (MVID), located in Okanogan County in the vicinity of Twisp, has been in operation since the early 1900's. The existing irrigation system of unlined ditches and canals is supplied by water diverted almost entirely from the Methow and Twisp rivers. The MVID holds state issued and claimed water rights for diversions in excess of 650 cfs. Actual diversions currently total an average of 67 cfs and provide water to 776 acres. The total acreage assessed by the MVID, 2,276 acres, cannot receive water due to the existing inefficient and unreliable system. Many of the MVID members have resorted to the use of groundwater wells to obtain their irrigation water.

Ecology has been working with the MVID since the mid 1970s to resolve water use efftciency and conservation issues. In 1991 the Yakama Indian Nation filed a lawsuit against the MVID for wasteful and excessive water use and against Ecology for not carrying out its duties in regulating the MVID. Ecology met with MVID directors and representatives of the Yakama Indian Nation and agreed to goals for providing upgrades to the current MVID irrigation system. The goals are: to provide a reliable system for members who desire water service; promote water conservation; increase instream flows for fisheries; avoid increased assessments; prevent disruptions to irrigation practices; preserve the landscape and aesthetics of the valley; and avert the possibility of the lawsuit by the Yakama Indian Nation to try and force reduced irrigation diversions. In order to meet the stated goals, Ecology provided funding and support for the MVID to prepare a comprehensive water supply facility plan. This plan was completed by the consulting firm of Montgomery Water Group, Inc. The estimated cost to implement the preferred alternative identified by the water supply facility plan is $4.4 million.

Ecology will provide between $1.5 and $2.0 million from the Referendum 38 Agricultural Water Supply Program for plan implementation. Because the preferred alternative will meet the irrigation needs of the MVID and increase streamflows in both the Methow and Twisp rivers, the Yakama Indian Nation presented and supported the project as an "Early Action Watershed Initiative" to the Northwest Power Planning Council (NPPC) The NPPC approved BPA funding for use in implementation of the water supply facility plan. BPA is providing approximately half the cost ($2.2 million) and WDFW about $275,000. A minority of the MVID members are opposed to implementation of the proposed preferred alternative.

Department of Ecology - the responsible state agency for the project. Yakama Indian Nation - strong supporter and cooperator. U.S. Department of Energy, BPA - the responsible federal agency for the project. MVID - will be recipient of funds for irrigation system improvements. MVID members dissenting with proposed project. NPPC - strongly supportive and key in securing federal appropriations. Colville Indian Nation - project within their ancestral lands. WDFW. Sen. Morton, Rep. Ballard & Rep. Chandler are following this project closely. Also US Senator Gorton (and staff) are monitoring the project.

9603501

Satus Watershed Restoration

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
Historically, Satus Creek was only one of many steelhead-producing tributaries of the Yakima River. Yet today, Satus Creek and its major tributaries account for approximately half of the steelhead in the entire Yakima River basin. Hence, the management of this watershed has profound implications for the steelhead run in the entire Yakima River basin. Land uses such as grazing, timber harvest, road building, and fire exclusion have altered the interactions between soil, water, and vegetation across the watershed. The cumulative effects of these land uses have altered the manner in which the watershed processes water and sediment. Superimposed on these cumulative effects are site-specific riparian disturbances such as unmanaged grazing and floodplain constriction. The results of these disturbances are increased peak flows, erosion, channel'instability and simplification, and degradation of riparian plant communities. The intent of this project is to increase the productivity of the Satus Creek summer steelhead population by restoring normative ecological function within the watershed. Coordinated restoration and monitoring address the structure, function, and connectivity of aquatic, riparian and upland zones.

Degraded watershed conditions are being addressed through promoting the aggradation of incised channels, road improvements, extensive revegetation projects, grazing management, and the preparation of a prescribed burning plan. Hydrologic recovery of the watershed will-occur as vegetation and drainage patterns gradually revert to more natural states. Site-specific efforts to increase channel stability are based on: 1) developing low-cost, low-input revegetation techniques, 2) creating small stable sites around which vegetation can establish and spread, and 3) reconnecting fragmented but persistently stable stream reaches. Low-cost, low-input techniques are essential because of the extent of the'system in need oftreatment, and because the need for repeated treatments will be dependent on the climate and flow conditions following the treatments. The effectiveness of restoration techniques will be assessed by tracking precipitation/runoff relationships, and measuring erosion, vegetative response, juvenile and adult steelhead abundance and habitat utilization, and production of outmigrating steelhead smolts.

Wenatchee and Methow River Coho- Restoration

SPONSOR/CONTRACTOR:
Lynn Hatcher, Yakama Indian Nation (509/865-6262)

GROUP:
Anadromous Fish

ABSTRACT:
Coho are second only to chinook salmon in abundance in the Columbia River Basin. Current abundance centers in lower Columbia River tributaries. The longest distance coho are known to have migrated in the Columbia River was to the Spokane River, 700 miles from the ocean. Coho traveled 400-500 miles to reach spawning areas in the Yakima, Wenatchee, Entiat, and Methow river drainages.
Based on geographic distribution of known past and present habitat, 42% or 50,000-70,000 coho attributable to the upper Columbia River would have originated in the Yakima River drainage. Estimates for other upstream rivers are: Wenatchee, 6,000-7,000 coho; Entiat, 9,000-l 3,000 coho; Methow, 23,000-3 1,000 coho.

Habitat degradation has occurred throughout the Yakima and Mid-Columbia subbasin as a result of agricultural practices, including grazing, irrigation and fluctuations in stream flow. Diversion dams were long ago constructed on small spawning tributaries . Dams were also constructed on larger tributaries for irrigation, power and flood control. These dams impacted passage of both adults and juveniles. Mainstem Columbia River dams have caused extreme impacts on juvenile and adult survival. Loss of riparian area from residential and recreational home development, channelization, and road construction continues to be a problem.

Coho have also suffered the additional impacts of extremely heavy harvest exploitation in ocean and lower Columbia River Fisheries. With the construction of Mitchell Act hatcheries in the 1960s and 197Os, harvest rates on the lower Columbia were designed to maximize harvest of lower mainstem hatchery stocks which could sustain high exploitation rates. During this period, harvest rates on Columbia River stocks often exceeded 90 percent effectively wiping out weak, natural upper Columbia River populations.

In addition to the habitat problems and high exploitation rates, fish production programs in the subbasin have been limited or nonexistent. While production programs have been planned since the adoption of the Power Council's Fish and Wildlife-Program, to date, these programs have not been implemented. The Yakima Nation is proposing to restore through supplementation Yakima River and Mid-Columbia-coho populations with early stock coho from lower river hatcheries in order to -further natural production and harvest goals identified in the Yakama Nation's "Coho Salmon Species Plan for the Yakima River Basin" and "Coho Salmon Species plan for the Mid-Columbia River Basin" (CSSP). With this project, adult and/or juvenile coho from appropriate lower river hatcheries will be transferred to selected habitats or acclimation ponds in the Yakima River and/or Mid-Columbia tributaries. It is, expected that transferred adults will spawn naturally in areas close to where they are released with the resulting production rearing in suitable production areas identified in the CSSP for about 17 months prior to out migration. Juvenile releases would rear for up to one year in suitable production areas, then return after ocean migration to these same areas to spawn. Pre-smolts will be acclimated for one month in low cost ponds prior to release.

The goal of the Yakama Nation CSSP is to restore coho salmon populations to levels of abundance and productivity in suitable natural habitats throughout the Yakima River Basin and Mid-Columbia sufficient to sustain annual harvest by tribal and other fishers.

Johnson Creek Artificial Propagation Enhancement

SPONSOR/CONTRACTOR:
Paul A. Kucera, Nez Perce Tribe (208/843-732(l)

GROUP:
Anadromous Fish

ABSTRACT,:
The Johnson Creek artificial propagation enhancement project is a small-scale production initiative designed to increase survival of a weak but recoverable population of summer chinook salmon. Coordination for development of this project is supported by state, federal, and tribal representatives through the Columbia Basin Fish and Wildlife Authority (CBFWA). Under-the Northwest Power Planning Council's (NPPC) Columbia Basin Fish and Wildlife Program measure 7.4.A calls for "...identify, evaluate and implement new production. initiatives. The program is one of the fifteen (15) high priority supplementation projects supported by NMFS and the US v. OREGON Production Advisory Committee. All activities will comply with the Endangered Species Act (ESA) protocols for artificial propagation of Pacific Salmon. Coordination will occur between Nez Perce Tribe (lead), Idaho Department Fish and Game, National Marine Fisheries Service, Shoshone Bannock Tribe, and other agencies as necessary.

Johnson Creek, a tributary of the South Fork, Salmon River is located in North Central Idaho. This population has been monitored under the US CANADA treaty' for many years and is one of the 39 populations listed under the Endangered Species Act. The Johnson Creek summer chinook salmon population has experienced significant decline in population numbers over the past five decades. Escapement levels in Johnson Creek have declined from a recorded high of486 redds in 1960 to a low of five (5) redds in 1995. The NMFS draft recovery plan states that "captive broodstock and supplementation programs should be initiated and/or continued for populations identified as being at eminent risk of extinction, facing severe inbreeding depression, or facing demographic risks".

The supplementation project will begin in 1977 to develop portable adult collection and holding and juvenile rearing and acclimation facilities in Johnson Creek. The project will evaluate the benefits of on-site rearing/acclimation which may include such supplementation initiatives such as captive brood stock and cryopreservation, in conjunction with portable, low-capital techniques for holding adults, acclimating juveniles, and the conversion of existing artificial production facilities to produce smolts and/or other approaches as necessary to increase the population.

Progress reports and data results will be provided through the standard BPA reporting process.

9604400

Grande Ronde Basin Spring Chinook Captive Broodstock Program

SPONSOR/CONTRATOR:
Richard W. Carmichael, ODFW (541/962-3777)

GROUP:
Anadromous Fish

ABSTRACT:
The numbers of spring/summer chinook salmon in the Snake River run, including populations in the Grande Ronde River basin of NE Oregon, have declined to the point where these fish were listed under the Endangered Species Act. The National Marine Fisheries Service's Proposed Recovery Plan and the Northwest Power Planning Council's Fish and Wildlife Program call for the use of captive broodstock programs to help prevent their extinction. In 1995, the Oregon Department of Fish and Wildlife and Nez Perce Tribe began implementing a captive broodstock program with the Lostine River, upper Grande Ronde River and Catherine Creek stocks of spring chinook salmon. The program is designed around the collection of parr from each stream which are brought into captivity, reared to maturity, spawned, and their progeny returned to the natal stream as smolts. The program attempts to integrate captive and natural production to ensure that the minimum escapement to each of these streams in any given year is 150 salmon. Since most captive broodstock programs for salmonids are relatively new, numerous uncertainties have been identified. Thus, the program in NE Oregon is also attempting to address experimentally whether seawater or accelerated rearing improves the performance of the salmon in this program. In the summers of 1995 and 1996 we collected 499 and 481 parr (respectively) from the Lostine River, 498 and 500 parr (respectively) from Catherine Creek as well as 110 and 0 parr (respectively) from the upper Grande Ronde River. Once the design of the rearing containers was finalized, overall mortality has been less than 5%. As two-year-olds, approximately 20% of the males matured whereas 0% of tbe females matured. We plan to continue following performance measures. associated.with the captive chinook salmon, their Fl progeny as well as the F2 generation.

Riparian and Fish Habitat Analysis, Protection and Enhancement to Increase Natural Production of Steelhead and Spring Chinook in the Walla Walla River Basin

SPONSOR/CONTRACTOR:
Gary James, CTUIR (541/276-4109)

GROUP:
Anadromous Fish

ABSTRACT:
In 1996, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) began a habitat restoration project in the Walla Walla River Basin. This project was initiated to protect and restore vital spawning and rearing habitat for salmonid fishes. It is expected that these efforts will enhance the natural production of salmonid fishes within the basin. To date, CTUIR has walked several potential project locations, met with and mailed letters to landowners, and worked cooperatively with Oregon Department of Fish-and Wildlifeand the local Watershed Council in planting several thousand willows and cottonwoods. In recent months, CTUIR has been active in the formation of the Walla Walla Watershed Alliance. Through this group, CTUIR and the Columbia, Walla Walla, and Umatilla County Conservation Districts created a document aimed at providing restoration guidelines within the basin. Other efforts have been focused on identifying key areas for restoration with an emphasis on spawning and rearing areas. Also, outreach activities with various groups, including the Alliance, are identifying potential project locations and interested landowners. From this, long-term easements will be signed with landowners and implementation will begin thereafter. Planned activities include further communication with various agency staff and landowners and with this information implement habitat projects that most benefit salmonid fishes within the Walla Walla River Basin.

9605300

North Fork John Day River Dredge Tailings Restoration Project

SPONSOR/CONTRACTOR:
John Sanchez, USFS (541/278-3819)

GROUP:
Anadromous Fish

ABSTRACT:
Thousands of miles of western streams were severely altered by dredge mining for gold. Dredges, some up to three stories high, turned stream bottoms and riparian areas upside down in search of the precious metal. Large piles of rock, many over 15 feet high, were left behind as rivers and streams were mined.

The North Fork John Day (NFJD) River has over 9 miles of dredge-tailing-influenced floodplains. In these areas, the river is constrained between tailings and the streambank. With the water course cut off from its floodplain by piles of rocks, the channel has nowhere to dissipate the energy of high flows. Consequently, the river erodes its streambanks. Raw banks 25 feet high and hundreds of feet long are one result of the changed river dynamics. Another result is simplified channels with little aquatic habitat or complexity.

In 1988, the NFJD River, from 'its headwaters in the North Fork John Day Wilderness to Camas Creek, was added to the federal Wild and Scenic River (W&SL) System. The designated section is 54.1 miles long and classified into five segments. The intent of the Act, as expressed in the enabling legislation, is to preserve free-flowing condition, protect water quality, and enhance the identified outstandingly remarkable values. The outstandingly remarkable values identified on the NFJD are scenery, recreation, fish, wildlife, and historic/prehistoric values.

The North Fork John Day Restoration project consists of redistributing dredge tailing piles, approximately 250,000 cubic yards of rock and gravel, within the floodplain of the river, including intermittent side channels and the main river channel. This treatment will allow the river to pass high flows and dissipate energy and deposit sediment and would allow the river to meander through the floodplain and-create quality fish and wildlife habitat. The purpose of the project is to improve salmonid rearing habitat, water quality, streambank stability, and floodplain function.

The project is supported by the USFWS, ODFW, CTUIR, and CTWST through use of John Day River acid spill mitigation trust fund dollars.

Walla Walla County Cooperative Watershed Plan (Development and Implementation)

SPONSOR/CONTRACTOR:
Mark Taylor, Walla Walla County Conservation District (509/522-6340)

GROUP:
Anadromous Fish

ABSTRACT:
The Walla Walla Basin is located in southeastern Washington and northeastern Oregon. Its waters originate in Columbia County (Washington) and Umatilla County (Oregon) and flow through Walla Walla County (Washington) and into the Columbia River. Its uniquely mild climate offers an ideal location for one of the country's most diversified agricultural productionarea, producing dryland grains and legumes, potatoes, corn, asparagus, grapes, apples, seet cherries, and the famous Walla Walla Sweet Onions.

The Walla Walla Basin is home to wildlife from beaver to bear, elk, and deer. Vast populations of migratory wildfowl, song birds, and upland game birds reside throughout the basin during the year. Populations of anadromous and native fish inhabit the waters of the Walla Walla Basin. Chinook salmon that were once plentiful in the basin are now extinct, and are survived by steelhead and bull trout populations (both of which are close to being listed on the Endangered Species List).

The project's goal is to protect riparian areas and enhance fish habitat through the installation of fish habitat enhancement project which include, but are not limited to, bio-engineering bank stabilization, riparian restoration, Best Management Practices in the upland areas, and in-stream projects.

The project's other goal is to increase the public's awareness and involvement by developing an intense Watershed Management Education Program, develop locally led Watershed Management Teams, and a Basin Technical Advisory Committee which will prioritize the needs and critical areas throughout the basin and complete the development of a Watershed Management Guide to assist land owners in the implementation of watershed management practices.

One final goal is to teach local land owners to implement fish friendly practices throughout the basin, and discuss how to increase in-stream flows during periods of the growing season that would allow the reintroduction of salmon into the Walla Walla Basin.

9607700

Meadow Creek Restoration

SPONSOR/CONTRACTOR:
Wayne J. Paradis, USFS (208/983-1963)

GROUP:
Anadromous Fish

ABSTRACT:
In 1992, the U.S. Forest Service acquired 198 hectares (490 acres) of previously private meadow ground known as McComas Meadows. According to Nez Perce tribal historian Alan Slickpoo, the meadows were a traditional site for Native American harvest of both salmon and steelhead. Early settlers homesteaded the area, and until the time of purchase, the meadows were extensively hayed and grazed. These processes had caused decline in the riparian hardwoods, and corresponding bank deterioration and sedimentation.

McComas Meadows lie along Meadow Creek, which is located on the Clearwater Ranger District of the Nez Perce National Forest. Meadow Creek is a relatively large system which enters the South Fork Clearwater River at river kilometer 52.3. The watershed ranges in-elevation from 701 meters at the South Fork to 1,829 meters at its headwaters, and consists mostly of grand fir habitat types. The creek system is approximately 24 kilometers long, and drains 9,770 hectares (24,115 acres). Populations of steelhead trout, chinook salmon, west slope cutthroat, eastern brook trout, rainbow trout and bull trout inhabit the creek.

Meadow Creek is thought to have an excellent potential for anadromous fish production. In 1981, a hatching channel was constructed on North Meadow Creek, in which almost six million eyed steelhead eggs were planted between 1981 and 1988. In addition, Meadow Creek was stocked with 1,771,916 surplus steelhead fry from Dworshak National Fish Hatchery between 1977 and 1980, and 100,000 chinook salmon fry from Rapid River in 1988.

In 1962, survey crews identified a partial migration barrier near the mouth of Meadow Creek, consisting of a succession of boulder cascades some 200 feet in length. Observation in 1985 indicated. that most steelhead and all chinook were being blocked by these barriers. (It is thought that the barriers were formed by landslides subsequent to the Native American harvest of salmon in McComas Meadows.) In 1986, the Bonneville Power Administration funded a S13,800 project to modify the barriers for both steelhead and salmon passage. Explosives were used to remove large boulders, and rock weirs were constructed to deepen pools and provide for fish passage.

Removal of the barrier made available spawning, rearing and over-wintering habitat. Full seeding of the Meadow Creek system would produce 29,300 spring chinook and 22,000 summer steelhead smolts, and a corresponding escapement (and increase) of approximately 200 adults of each species to the South Fork Clearwater system. Several adult salmon and salmon redds were observed in the Meadows in 1992 and 1993, probably as a result of the 1988 smolt plants.

In order to improve riparian and bank conditions, the Forest Service has excluded cattle from the meadow area. Existing fencing was not adequate to completely exclude cattle in 1992, although relatively little use occurred. Extensive repairs to the fence in the spring of 1993 resulted in complete

exclusion in subsequent years.

In addition, some shrubby vegetation has been planted along unstable banks. Alder seed was collected from parent plants in the meadows during the fall of 1993, and propagated by a Forest Service nursery. About 250 alder resulting from this effort were planted in the fall of 1994, but planting success appears to have been negligible. A few willow cuttings were planted during the summer of 1995, and a few willow and cottonwood cuttings were planted in the spring of 1996.

The Forest Service has initiated several monitoring projects to document the recovery of the meadow system. They include:

1) Photopoints

2) Aerial Photography with fixed reference points three scales, true color, infrared, diapositives allows detailed computer mapping and aerial monitoring

3) Video Aerial Photography

4) Channel Profiles, professionally surveyed from fixed reference points

5) Thalwag Profile and Residual Pool Volume Analysis

6) Water Temperature Monitoring (Nez Perce **Tribe)**

7) Fish Density Monitoring (snorkeling at fixed locations)

8) Amphibian Monitoring (egg counts at fixed locations)

9) Woody Species Age Class Monitoring (variation of Idaho Department of Environmental Quality protocol)

10) Cobble Embeddedness. measurements and Wolman Pebble Counts at. fixed locations

11) Historical Background Information Collection (for establishing ecological trends and potential objectives)

12) Redd surveys for steelhead (3 yrs) and chinook salmon (1 yr)

(Many of the monitoring activities have been conducted with the assistance of several other agencies and organizations, including: Idaho Division of Environmental **Quality,** Nez Perce Tribe, Idaho Fish and Game, BLM, SCC, Soil Conservation Service, Trout Unlimited, Bring Back the Natives and the Grangeville School District.)

Northeast Oregon Wildlife Mitigation Project

SPONSOR/CONTRACTOR:
Keith A. Lawrence, Nez Perce Tribe (208/843-7328)

GROUP:
Wildlife

ABSTRACT:
In September of 1996 the Nez Perce Tribe and the Bonneville Power Administration entered into an agreement to implement a 16,500 acre wildlife mitigation project attributed to the impacts of the Lower Snake River dams. The area approved for project implementation encompasses a comer of Northeast Oregon and Southeast Washington. On November 1,1996 the Tribe acquired title to 10,300 acres of land adjacent to the Wallowa-Whitman National Forest boundary and between Joseph Creek and Cottonwood Creek. The land is dissected by deep canyons and dominated by native grasslands, but there is also approximately 7 million board feet of trees of the property. Negotiations are underway with adjacent landowners. Staff is gathering the maps and arranging for acquisition of aerial photos needed to support an inventory of resources found on the property already acquired. An inventory of the project resources is expected to start this calendar year. Once land is acquired and inventory completed, a management plan for the land will be developed. The January floods severely damaged one of the two roads used to administer the project lands, wiping out two small bridges and several sections of roadbed.

Coordination of Watershed Projects in Umatilla River Basin

SPONSOR/CONTRACTOR:
Luise Langheinrich, Umatilla Basin Watershed Council (541/278-3836)

GROUP:
Anadromous Fish

A B S T R A C T :
The Umatilla Basin Watershed Council (UBWC), in cooperation with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW), is involved in several Early Action Watershed Projects. For the purpose of this review, I will address the on-going effort in the Birch Creek sub-watershed and the Watershed Education Program for students in Umatilla and Morrow Counties. I will show the value-added aspect of funding these types of watershed coordination efforts.

Planning is required before on-the-ground projects can be implemented. To increase the probability of success there must be coordination and communication to attain cooperation of the appropriate stakeholders. This is where UBWC comes in. UBWC is perceived as neutral, non-government which is an asset when working with landowners and agency personnel on watershed issues. The Birch Creek Watershed project is a good example of UBWC involvement. This specific stream system is unstable and during high water events has catastrophic consequences for landowners. To complicate matters it also has a viable native steelhead population. The situation has been highly charged for several years due to misperceptions and miscommunications between landowners and agencies. UBWC stepped in to facilitate public meetings with landowners to get the issues out and addressed. A cursory stream channel morphology assessment, with potential, immediate low cost remedies, was done on East, West, and main Birch Creek. This was well received by the landowners and agencies. At this point the East Birch Creek watershed management plan, which will have a long-term implementation plan, is being developed through a stakeholder group consisting of ODFW, US Forest Service, representative landowners, City of Pilot Rock, industry, Umatilla County Soil & Water Conservation District, Umatilla County government representation, CTUIR, Columbia Basin/Blue Mountain Resource Conservation & Development Council, facilitated by UBWC. The value-added factor, by using UBWC, has been to get groups to work together toward a common goal in a win-win manner whereas, before it has been pretty hit and miss.

The Watershed Education Program is an example of supporting schools, ranging from elementary to high school, in developing class watershed projects. We have 11 school districts involved with projects such as fish rearing, native plant re-vegetation, groundwater studies, habitat surveys, water quality monitoring, and more. We have had classes go out with CTUIR to do riparian plantings for a participating landowner and to set up a willow nursery on J.R. Simplot land (an active partner) for getting cuttings for future work in the lower basin. Through another partner, Umatilla/Morrow Educational Service District, we were able to develop a site on Internet that describes the program and will include project write-ups by the students. The address is bbs.nclack.kl2.or.us. The site is rough and when you get there go to Natural Resource Systems, go to Umatilla Morrow NRS Consortium. The support for this program has been tremendous.

9700100

Captive Rearing Initiative for Salmon River Chinook Salmon

SPONSOR/CONTRACTOR;
David Cannamela, IDFG (208/334-3791)

GROUP:
Anadromous Fish

ABSTRACT:
The National Marine Fisheries Service has identified, in the Proposed Recovery Plan for Snake River Salmon, that "the goal for all three listed species of Snake River salmon (and their genetic and demographic subunits) is to recover naturally reproducing populations to levels where protection under the ESA are unnecessary" (NMFS 1995). The first challenge to meeting this goal is to preserve current stock structure in order to maintain options for future recovery. The NMFS has identified **about 30** chinook populations in Idaho that are part of the listed Snake River ESU. The Idaho Department of Fish and Game (IDFG) focused on management interventions that would affect multiple populations and minimize the risks (to target and non-target populations) associated with artificial propagation techniques; the captive rearing strategy represents such an approach. Captive rearing, if successful, will provide for the maintenance of target stock genetic material and provide adult spawners to meet out planting goals.

One key objective of the captive rearing initiative is to avoid extreme demographic, environmental, and genetic risks to specified cohorts. Our goal is to maintain a minimum number of ten spawning pairs per year in the wild for each targeted population. Potential benefits of the captive rearing approach include the ability to address more target populations than captive brood stock programs, which require substantially more space because of juvenile fish needs. Captive rearing minimizes the risk of altering native stock structure through inadvertent directional selection, behavioral modifications, and gross family size discrepancy between hatchery and natural cohorts.

Brood year 1994 juvenile fish were collected from the Lemhi River, upper East Fork Salmon River, **and** West Fork Yankee Fork Salmon River for this captive rearing initiative in summer, 1995. Record low 1994 adult chinook salmon returns to the Snake River basin prompted collection of these fish. Fish were held through the first winter at IDFG's Sawtooth Fish Hatchery, and then were transferred to IDFG's Eagle Fish Hatchery. One half of each stock was transferred to the NMFS Manchester, Washington facility for saltwater culture.

Essential M&E Infrastruchre - Pit Tag Monitor Procurement and Installation

SPONSOR/CONTRACTOR:
Larry Parrish, NMFS (503-230-4658)

GROUP:
Anadromous Fish

ABSTRACT:
The Transition Project is part of the Columbia River Basin-wide replacement of the 400 kHz PIT tag interrogation system with a 134.2 kHz ISO-based system. The existing 400 kHz system is limited and antiquated and will soon become obsolete as critical replacement parts become increasingly difficult to locate, if they can be found at all. Converting to the new ISO-based system is intended to provide significant benefits in read/detection distances with less power input and fewer FCC restrictions. Adopting the IS0 standards should lead to cost savings as expanded participation from multiple manufacturers and vendors occurs. The new system should move the region closer to adult salmonid detection capability.

A Transition Team has been established to guide the transition process. The Transition Team has representatives from PSMPC, NMFS, BPA, WDFW, IDFG, FPC and the Corps. The current plan is to have 134.2 kHz stationary PIT tag monitors installed at the mainstem Federal hydro projects in time to‘ detect the spring 1999 juvenile salmonid outmigration. In addition, Tribal, state and Federal anadromous fish managers should have 134.2 kHz portable (hand-held) transceivers available for use while tagging juveniles as early as summer of 1998. The remainder of FY97 will involve a field test of De&on-Fearing 134.2 kHz stationary transceivers at McNary Dam. The field test is designed to measure, among other things, the PIT tag detection equipment’s reliability while in use at a juvenile collection facility over a juvenile salmonid migration season. Also, the remainder of FY97 will include the procurement of portable ISO-based readers for use while tagging juvenile salmonids, the evaluation of IS0 tags (tag construction will be based on technical transponder requirements currently being developed by PSMFC), and the identification of infrastructure modifications at Corps’ facilities necessary to support the new frequency system. Most of FY98 will involve the infrastructure modifications required at each project to change out the 400 kHz monitors and replace them with new Destron-Fearing 134.2 kHz monitors.

9801006

Captive Broodstock Artificial Propagation

SPONSOR/CONTRACTOR:
Paul A. Kucera, Nez Perce Tribe (208/843-7320)

GROUP:
Anadromous Fish

ABSTRACT:
Nez Perce Tribe participation in Captive Broodstock Artificial Propagation activities in 1997 is currently funded through the U.S. Fish and Wildlife Service Lower Snake River Compensation Plan program office. Tribal work has included participation in the Captive Broodstock Conservation Planning Oversight Team (CONSPOT) and in the integrated team (IT) process. The Tribe is in the process of hiring a biologist to assist Oregon Department of Fish and Wildlife (ODFW) staff in the monitoring and evaluation of performance and survival of the Lostine River chinook salmon captive broodstock fish in the freshwater rearing strategy at Lookingglass Hatchery and Bonneville Hatchery and fish in the saltwater rearing strategy at Manchester laboratory. Other captive broodstock activities include collection of a random sample of juvenile chinook from the Lostine River, planning and coordination with the integrated team, maintaining a current captive broodstock database and preparation of cooperative annual reports with ODFW. Future activities will include evaluation of maturation age, size and timing, fecundity, fertilization success, performance of progeny from the captive brood within Lookingglass Hatchery, tagging and evaluation of captive brood smolt acclimated releases in the Lostine River, smolt performance and survival, estimating smolt to adult survival of the captive brood released smolts and reproductive success of the returning adults.

Projects by Program Area (Anadromous Fish, Resident Fish, Wildlife), Sponsor and Project Number

Sponsor	Project #	Title
PROGRAM AREA:	ANADROMOUS FISH	
Battelle Pacific Northwest National Laboratories	9207102	Technical Assistance for Juvenile and Adult Migrant Monitoring Facilities
BPA	8811500	Yakima Hatchery - Construction
BPA	9506300	Yakima/Klickitat Monitoring and Evaluation Program
CBFWF	55 13200	ESA Recovery Implementation Coordination
CBFWF	8906200	Prepare Draft Annual Implementation Work Plan
CBFWF	9202800	Fish Screen Oversight Committee (FSOC), Tributary Passage and Habitat Coordinator (TPHC)
CBFWF	**9600500**	Operation of the Independent Scientific Advisory Board
CH2M Hill	**9006900**	Yakima Hatchery - Final Design
Charlie Paulsen	9303701	Technical Assistance With the Life Cycle Model
COE	9204101	Evaluation of Adult Salmon and Steelhead Migration Past Dams and Through Reservoirs in the Lower Columbia River and Into Tributaries
Columbia River Inter-Triial Fish Commission	5503000	Columbia River Basin Watershed Restoration Activities: 1996 and 1997 Funding
Columbia River Inter-Tribal Fish Commission	5506000	Monitoring Fine Sediient Levels in Substrate and Overwinter Sedimentation in Cleaned Gravels in Portions of the **Grande** Ronde and John Day Rivers
Columbia River Inter-Tribal Fish Commission	5506100	Hydro Regulator Model Development
Columbia River Inter-Tribal Fish Commission	5506300	Evaluation of Watershed and Habitat Response to Recent Storms: Effects on Salmon Listed Under the Esa
Columbia River Inter-Tribal Fish Commission	9300802	Symptoms of Gas Bubble Trauma Induced in Salmon by Total Dissolved Gas Pressure Supersaturation in the Snake and Columbia **Rivers**
Colville Confederated Tribes	9502100	Okanogan Watershed Planning
Conservation Districts	9401800	Washington Model Watershed Habitat Projects
CTUIR	5507000	Grande Ronde Subbasin Watershed Restoration
CTUIR	8343500	Umatilla Hatchery Satellite Facilities Operation and Maintenance
CTUIR	8710001	Umatilla River Basin Anadromous Fish Habitat Enhancement
CTUIR	8802200	Umatilla River Basin Trap and Haul Program
CTUIR	8805302	Ne Oregon Hatchery - Grand Ronde Satellite Facilities
CTUIR	9000501	Umatilla Basin Natural Production Monitoring and Evaluation **(UBNMPE)**
CTUIR	9101408	Umatilla Hatchery Satellite Facilities - Planning, Siting, Design, and Construction
CTUIR	**9402600**	Pacific Lamprey Research and Restoration Project
CTUIR	**9506000**	Umatilla River Riparian Corridors: Squaw Creek Watershed Project (Anadromous Portion)
CTUIR	9601100	Juvenile Fish Screens and Smolt Traps at Irrigation Diversion Dams on the Walla Walla and Touchet Rivers in Oregon and Washington

Sponsor	Project #	Title
CTUIR	9601200	Adult Anadromous Fish Passage Improvement at Irrigation Diversion Dams on the Walla Walla River
CTUIR	9604600	Riparian and Fish Habitat Analysis, Protection and Enhancement to Increase Natural Production of Steelhead and Spring Chinook in the Walla Walla River Basin
Essa Technologies Ltd.	9600600	PATH - Facilitation, Tech Assistance & Peer Review
Grande Ronde Model Watershed Program (Blue Mtns.)	9402700	Grande Ronde Mode1 Watershed Habitat Projects
ID Soil Conservation Commission	9202603	Idaho Model Watersheds Admin/Impl. Support
IDFG	8332300	Smolt Condition & Arrival Timing at Lwr Granite
IDFG	8909800	Idaho Supplementation Studies (ISS)
IDFG	9005500	Steelhead Supplementation Studies in Idaho Rivers
IDFG	9107200	Redfish Lake Sockeye Salmon Captive
IDFG	9107300	Idaho Natural Prod. Monitoring/Eval 83-7 (ESA)
IDFG	9401500	Idaho Fish Screening Improvement (see new NPPC)
IDFG	9602000	1997 Hatchery Pit Tag Study
IDFG	9700100	Captive Rearing Initiative for Salmon River Chinook Sahnon
Lemhi and Custer Soil and Water Conservation Districts	9306200	Salmon River Anadromous Fish Passage Enhancement, Idaho
Lemhi and Custer Soil and Water Conservation Districts	9401700	Idaho Model Watershed Habitat Projects
National Biological Service	8200300	Selective Predation/Development of Prey Protection
National Biological Service	8740100	Travel Time and Survival Smolt Physiology
National Biological Service	9005200	Perf/Stock Prod Impacts of Hatchery Suppl
National Biological Service	9007800	System-Wide Significance of Predation on Juvenile Sahnonids in Columbia and Snake River Reservoirs and Evaluation of Predation Control Measures
National Biological Service	9102900	Life History of Fall Chin in Co1 River Basin
National Biological Service	9602100	Gas Bubble Disease Monitoring and Research of Juvenile Salmonids
Nez Perce Tribe	5520600	Listed Stock Gamete Preservation
Nez Perce Tribe	5520800	Listed Stock Adult Escapement Monitoring
Nez Perce Tribe	5520900	Wallowa County/Nez Perce Trii Salmon Habitat Recovery Plan Implementation
Nez Perce Tribe	5521300	Big Canyon Creek Portable Acclimation/Release Facility
Nez Perce Tribe	5521400	Pittsburg Landing Portable Acclimation/Release Facility
Nez Perce Tribe	5521500	Rogersburg (Above Mouth of Grande Ronde River) Portable Acclimation/Release Facility
Nez Perce Tribe	5522700	Enhanced Tribal Tributary Fish and Wildlife Law Enforcement-- Part 1. Nez Perce Tribes
Nez Perce Tribe	8335000	Nez Perce Tribal Hatchery
Nez Perce Tribe	8805301	Northeast Oregon Outplanting Facilities Master Plan - Nez Perce Tribe
Nez Perce Tribe	8909802	Salmon Supplementation Studies in Idaho Rivers - Nez Perce Tribe

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Conservation Districts.	9401800	Washington Model Watershed Habitat Projects
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CTUIR	8805302'	Ne Oregon Hatchery - Grand Ronde Satellite Facilities
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Nez Perce Tribe	5522700	Enhanced Tribal Tributary Fish and Wildlife Law Enforcement-- Part 1. Nez Perce Tribes
Nez Perce Tribe	8335000	Nez Perce Tribal Hatchery
Nez Perce Tribe	8805301	Northeast Oregon Outplanting Facilities Master Plan - Nez Perce Tribe
Nez Perce Tribe	8909802	Salmon Supplementation Studies in Idaho Rivers - Nez Perce Tribe

Sponsor	Project #	Title
Nez Perce Tribe	9303600	Haysfork Glory Hole, Newsome Creek Placer Mine Silt Trap - Nez Perce Tribe
Nez Perce Tribe	9401004	Monitoring and Evaluation of Lyons Ferry Hatchery Fall Chinook **Above** Lower Granite Dam
Nez Perce Tribe	9403400	Assessing Summer/Fall Chinook Restoration in the Snake River Basin
Nez Perce Tribe	9403900	Wallowa Basin Project Planning - G. R. Model Watershed
Nez Perce Tribe	9604300	Johnson Creek Artificial Propagation Enhancement
Nez Perce Tribe	9801006	Captive Broodstock Artificial Propagation
NMFS	8331900	New Fish Tag System
NMFS	8909600	Genetic Monitoring and Evaluation of Snake River Salmon and Steelhead
NMFS	9102800	Monitoring the Smolt Migrations of Wild Snake River Spring/Summer' Chinook Salmon
NMFS	9105500	Supplementation Fish Quality (Yakima)
NMFS	9202200	Wild Smolt Behavior/Physiology (ESA)
NMFS	9204000	Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research
NMFS	9302900	Survival Estimation for Dam/Reservoir Passage
NMFS	9305600	Assessment of Captive Broodstock Tech
NMFS	9602200	Evaluating Effects of Dissolved Gases on Resident Fish
NMFS	9602400	Changes in Gas Bubble Disease Signs and Survival of Migrating Juvenile Sahnonids Experimentally Exposed to Supersaturated Gases
NMFS	**9701000**	***Essential*** **M&E** Infrastructure - Pit Tag Monitor Procurement and Installation
ODFW	8402100	Mainstem, Middle Fork, and N. Fork John Day River
ODFW	8402500	Grande**Ronde Habitat Enhancement**
ODFW	8612400	Insp Serv for Little Fall Creek Pass Re:86-090
ODFW	8710002	Umatilla Habitat Improvement / ODFW
ODFW	8805304	Hood River Production Program - ODFW - M&E
ODFW	88 16000	Willamette Hatchery Oxygen Supplementation
ODFW	8902401	Eval Umatilla Basin Prj - 3-Mile/Weid Canal Scr
ODFW	8902900	Hood River Production Program - Pelton Ladder - Hatchery
ODFW	8903500	Umatilla Hatchery Operations and Maintenance
ODFW	8906900	**AM** Cd Wire Tag Prog-Missing Prod OR Htch (ODFW)
ODFW	9000500	Umatilla Hatchery - Monitorhtg/Eval Projects
ODFW	9202604	Spring Chinook-Salmon Early Life History
ODFW	9301900	Hood River Production Program (Parkdale Design & Construction)
ODFW	9304000	Fifieenmile Creek Habitat Improvement
ODFW	9304500	Buck Hollow Watershed Enhancement (ODFW)
ODFW	9306000	Columbia River Terminal Fisheries Research Project
ODFW	9306600	Oregon Fish Screens Project
ODFW	9404200	Trout Creek Operation & Maintenance
ODFW	9600800	**PATH** - Participation by State and Tribal Agencies
ODFW	9604400	Grande Ronde Basin Spring Chinook Captive Broodstock Program

Sponsor	Project #	Title
Oregon State University/CRITFC	5505900	Predation by Fish-Eating Birds on Juvenile Salmonids in the Columbia River Basin
PGE	9500700	Hood River Production Program - PGE O&M
Pocket Water Inc/River Master Engineering	9303501	Lower Red River Meadow Restoration Project
PPLAJECA	8902700	Power/Repay O&M for USBR CPR Pumping Proj
PSMFC	8201300	Coded-Wire Tag Recovery
PSMFC	8401400	Smolt Monitoring at Federal Dams
PSMFC	8712700	Smolt Monitoring by Non-Federal Entities
PSMFC	8810804	Streamnet (formerly CIS and NED)
PSMFC	9007700	Northern Squawfish Management Program
PSMFC	9008000	Columbia Basin Pit-Tag Information System
PSMFC	9204300	Integrated Hatchery Operations Team
PSMFC	9403300	Fish Passage Center
PSMFC	9601600	In-Season Operations Technical Management Team (TMT) Support
Shoshone-Bannock Tribes	5513800	Lower Snake River Naturalization
Shoshone-Bannock Tribes	5514ooo	Salmon River Production Program
Shoshone-Bannock Tribes	8909803	Salmon Supplementation Studies in Idaho Rivers - Shoshone-Bannock Tribes
Shoshone-Bannock Tribes	9107100	Snake River Sockeye Salmon Habitat
Shoshone-Bannock Tribes	9405000	Salmon River Habitat O&M/Monitoring & Evaluation
Shoshone-Bannock Tribes	9600700	Upper Salmon River Diversion Consolidation Program
U.S. Department of Energy	8506200	Passage Improvement Evaluation
U.S. Department of Energy	8907201	Independent Scientific Group Support
Umatilla Basin Watershed Council	9608500	Coordiition of Watershed Projects in Umatilla River Basin
Univ/ID, subcontractor WSU	9009300	Genetic Analyses of Oncorhynchus Nerka (ESA)
Univ/WA	8910700	Epidemiological Survival Method
Univ/WA	8910800	Monitoring and Evaluation Modeling Support.
US BOR	8343600	Umatilla Passage O&M
US BOR	9107500	Yakiia Phase II Screens - Construction
US BOR	9503300	O&M of Yakima Fish Protection, Mitigation & Enhancement Facilities
USFS	5519100	Meadow Creek Instream Structure and Riparian Evaluation
USFS	5520100	O'Hara Watershed Restoration
USFS	8400800	North Fork John Day Habitat Improvement
USFS	920260 1	Grande Ronde Model Watershed - Admin/Impl./Research
USFS	9203200	Life-cycle Model Development and Application to System and Subbasin Planning in Snake River
USFS	9303800	North Fork John Day Area Riparian Fencing
USFS	9605300	North Fork John Day River Dredge Tailings Restoration Project
USFS	9607700	Meadow Creek Restoration
USFWS	5504200	1996 Pittsburg Landing O&M and M&E Funding
USFWS	5507300	Hardy Creek Chum Salmon Spawning Habitat Improvement Project

Sponsor	Project #	Title
USFWS	8906500	Annual Fish Marking Program-Missing Hatchery Production Groups OR/WA/ID (USFWS)
USFWS	890980 1	Salmon Supplementation Studies in Idaho Rivers - USFWS
U S F W S	9202400	Columbia Basin Law Enforcement Program
Walla Walla County Conservation District	9606400	Walla Walla County Cooperative Watershed Plan (Development and Implementation)
warm springs Tribe	8805303	Hood River Production Program - CTWS - M&E
Wasco Co SWCD	9303000	Buck Hollow Watershed Enhancement (SWCD)
Washington State Conservation Commission	9202602	Eastern WA Model Watershed Coordinators
WDFW	5503800	1996-97 Evaluation of Juvenile Fall Chinook Stranding on the Hanford Reach
WDFW	5507700	Monitoring of Supplementation Response Variables for YKFP
WDFW	8816300	Effects of Coded Wire Tagging on the Survival of Spring Chinook
WDFW	8903000	Effects of Acclimation on the Survival of Spring Chinook Salmon aka: Eva1 of Pre-Rel Temp Acclimation at Klickitat Htch
WDFW	8906600	Ann Cd Wire Tag Prog-Missing Prod WA Htch (WDF)
WDFW	9105700	Yakima Phase 2 Screen Fabrication
WDFW	9200900	YakimaScreens-PhaseII-O&M
WDFW	9207300	An Automated Fish Marking and Tagging System
WDFW	9506401	Refinement of Marking Methods for YKFP
WDFW	9506402	Upper Yakima Species Interaction Studies
WDFW	9506404	Policy/Technical Involvement and Planning for YKFP
Y akama Indian Nation	5509900	Methow Basin Side Channel Habitat Construction
Yakama Indian Nation	5510200	Yakima River Basin Side Channel Survey and Rehabilitation
Y akama Indian Nation	5510500	Cabin Creek Habitat Enhancement Project
Yakama Indian Nation	5510800	Upper Yakima Tributary Irrigation Improvement
Yakama Indian Nation	5510900	Teanaway River Instream Flow Restoration
Yakama Indian Nation	5511300	Little Naches River Riparian and In-Channel Habitat Enhancement Project
Yakama Indian Nation	5511600	Yakima Basin Side Channels
Yakama Indian Nation	5511700	Yakima River Rearing Habitat Enhancement, Between-Selah and Union Gaps
Yakama Indian Nation	55 12000	Toppenish/Simcoe Instream Flow Restoration
Yakama Indian Nation	55 12600	Upper Klickitat.Meadows Riparian Restoration
Yakama Indian Nation	5512700	Klickitat Basin Culvert Rehabilitation
Yakama Indian Nation	5512800	Lower Klickitat River Riparian and In-Channel Habitat Enhancement Project
Yakama Indian Nation	5522100	Development and Refinement of Natural Production Objectives and Enhancement Strategies for Yakima Basin Anadromous Salmonids
Yakama Indian Nation	8812001	Yakima/Klickitat Fisheries Project Management
Yakama Indian Nation	8812004	Hatchery Training and Education
Yakama Indian Nation	8812005	Fish Passage Video Monitoring
Yakama Indian Nation	8812008	Fisheries Technician Field Activities

Sponsor	Project #	Title
Yakama Indian Nation	9506809	Klickitat Passage/Habitat Preliminary Design
Yakama Indian Nation	9603201	Hanford K-Basin Fall Chinook Acclimation and Master Plan Development
Y akama Indian Nation	9603301	Yakiia River Fall Chinook-Supplementation
Yakama Indian Nation	9603302	Yakima River Coho Restoration
Yakama Indian Nation	960340 1	Methow Valley Irrigation District Conversion
Yakama Indian Nation	960350 1	Satus Watershed Restoration
Yakama Indian Nation	9604000	Wenatchee and Methow River Coho Restoration
Yakima Education Service District	9405900	Yakima Basin Environmental Education

PROGRAM AREA: RESIDENT FISH

Burns Paiute Tribe	5508600	Stinkingwater Sahnonid Project
Coeur d'Alene Tribe	9004400	Strm Survey, Htchry, Hab Improv, Mntr Coeur D
Colville Confederated Tribes	8503800	Colville Tribal Fish Hatchery
Colville Confederated Tribes	9001800	Habitat Improvement - Lake Roosevelt
Colville Confederated Tribes	9501100	Chief Joseph Kokanee Enhancement Project
Confederated Salish & Kootenai Tribes	9101901	Hungry Horse Fisheries Mitigation - Confederated Salish and Kootenai Tribes
IDFG	8709900	Dworshak Dam Impacts Assessment
IDFG	8806500	Kootenai River Fisheries Investigations
IDFG	9106700	Idaho Water Rental - Resident F&W Impacts - Phase III
IDFG	9404700	Lake Pend Oreille Fishery Recovery
IDFG/KTOI	9401200	Kootenai River White Sturgeon - M&E
Kalispel Tribe of Indians	5522300	Box Canyon Watershed Project
Kalispel Tribe of Indians	9500100	Kalispel Tribe Resident Fish
Kootenai Tribe	8806400	Kootenai River White Sturgeon Study and Experimental Aquaculture
Kootenai Tribe	9404900	Kootenai River Ecosystem Improvements Study
LRDA	9500900	Lake Roosevelt Rainbow Trout Net Pens
MDFWP	8346500	Libby and Hungry Horse Modeling Technical Analysis
MDFWP	8346700	Libby Reservoir Levels/Kootenai IFIM
MDFWP	9101903	Hungry Horse Mitigation/Habitat Improvements
MDFWP/CSKT	9500400	Libby Reservoir Mitigation Plan
MDFWP/CSKT	9502500	Flathead River Instream Flow Study
Nez Perce Tribe	8740700	Dworshak Impacts/M&E & Bio-Int Rule Curves
Nez Perce Tribe	9501300	Nez Perce Trout Ponds
Nez Perce Tribe	9501600	Genetic Inventory We&slope Cutthroat Trout
ODFW	8605000	White Sturgeon Productivity Status and Habitat Requirements
ODFW	9405300	Bull Trout Assessment - Willamette/Mckenzie
ODFW	9405400	Bull Trout Studies in Central and NE Oregon
Shoshone-Bannock Tribes	9201000	Habitat Restoration/Enhancement Fort Hall Bottoms
Shoshone-Bannock Tribes	9500600	SBT/SPT Joint Culture Facility
Shoshone-Paiute Tribes	5505600	Habitat Enhancement & Protection - Shoshone-Paiute Reservation

Sponsor	Project #	Title
Shoshone-Paiute Tribes	88 15600	Duck Valley Fish Stocking Program
Shoshone-Paiute Tribes	9501500	Billy Shaw Res Development
Spokane Tribe	5503500	Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams
Spokane Tribe	9104600	Spokane Tribal (Galbr Sprgs) Hatchery - O&M
Spokane Tribe	9404300	Lake Roosevelt Monitoring / Data Collection Program
USFWS	9 10 1904	Hungry Horse Mitigation - Creston Fish Recovery
WDFW	9 104700	Sherman Creek Hatchery - O&M
PROGRAM AREA: WILDLIFE		
CTUIR	9009200	Conforth Ranch - O&M and Enhancements
CTUIR	9506001	Umatilla River Riparian Corridors: Squaw Creek Watershed Project (Wildlife Portion)
IDFG	9206100	Albeni Falls Wildlife Mitigation Implementation (formerly Pend Oreille Wetlands [IDFG] - Phase I)
IDFG	9505700	South Fork Snake/Sand Creek Wildlife Mitigation
Kalispel Tribe of Indians	5503700	Kalispel - Pend Greille Wetlands 100 Acre Extension
Kalispel Tribe of Indians	9106900	Kalispel - Pend Greille Wetlands
Nez Perce Tribe	9608000	Northeast Oregon Wildlife Mitigation Project
NPPC	5522900	Wildlife Plan: Standardize M&E
ODFW	5519400	Securing Mitigation Sites for Wildlife in the Columbia Basin of Oregon
ODFW	5519500	Willamette River Confluence Mitigation Site
ODFW	9107809	Burlington Bottoms Wildlife Mitigation Project
The Nature Conservancy	9205900	Amazon Basin/Eugene Wetlands - Phase II
WDFW	9305800	WDFW - Washington Wildlife Mitigation Agreement

Project #	Title	FY96Auth.	FY97
5503000	Columbia River Basin Watershed Restoration Activities: 1996 and 1997 Funding		500,000
5503500	Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams		17,280
5503700	Kalispel - Pend Oreille Wetlands 100 Acre Extension		200,000
5503800	1996-97 Evaluation of Juvenile Fall Chinook Stranding on the Hanford Reach		200,000
5504200	1996 Pittsburg Landing O&M and M&E Funding		0
5505600	Habitat Enhancement & Protection - Shoshone-Paiute Reservation		463,094
5505900	Predation by Fish-Eating Birds on Juvenile Salmonids in the Columbia River Basin		125,000
5506000	Monitoring Fine Sediment Levels in Substrate and Overwinter Sedimentation in Cleaned Gravels in Portions of the Grande Ronde and John Day Rivers		30,000
5506100	Hydro Regulator Model Development		92,000
5506300	Evaluation of Watershed and Habitat Response to Recent Storms: Effects on Salmon Listed Under the Esa		115,000
5507000	Grande Ronde Subbasin Watershed Restoration		150,000
5507300	Hardy Creek Chum Salmon Spawning Habitat Improvement Project		83,790
5507700	Monitoring of Supplementation Response Variables for YKFP		200,000
5508600	Stinkingwater Salmonid Project		183,366
5509900	Methow Basin Side Channel Habitat Construction		527,850
5510290	Yakima River Basin Side Channel Survey and Rehabilitation		474,880
5510509	Cabin Creek Habitat Enhancement Project		162,400
5510800	Upper Yakima Triiutary Irrigation Improvement		246,400
5510900	Teanaway River Instream Flow Restoration		1,680,000
5511300	Little Naches River Riparian and In-Channel Habitat Enhancement Project		89,600
55 11600	Yakima Basin Side Channels	1,005,760	
5511700	Yakima River Rearing Habitat Enhancement, Between Selah and Union Gaps		246,400
55 12000	Toppenish/Simcoe Instream Flow Restoration		308,000
5512600	Upper Klickitat Meadows Riparian Restoration		32,292
55 12700	Klickitat Basin Culvert Rehabilitation		35,000
55 12800	Lower Klickitat River Riparian and In-Channel Habitat Enhancement Project		665,280
5513200	ESA Recovery Implementation Coordination		200,000
5513800	Lower Snake River Naturalization		125,000
55 14000	Salmon River Production Program		50,000
5519100	Meadow Creek Instream Structure and Riparian Evaluation		60,000
55 19400	Securing Mitigation Sites for Wildlife in the Columbia Basin of Oregon		275,000
5519500	Willamette River Confluence Mitigation Site		200,000

Project #	Title	FY96 Auth. S	FY97 s
5520100	O'Hara Watershed Restoration		35,009
5520600	Listed Stock Gamete Preservation		110,447
5520800	Listed Stock Adult Escapement Monitoring		139,669
5520900	Wallowa County/Nez Perce Tribe Salmon Habitat Recovery Plan Implementation		50,000
5521300	Big Canyon Creek Portable Acclimation/Release Facility		**0**
5521409	Pittsburg Landiig Portable Acclimation/Release Facility		**0**
5521500	Rogersburg (Above Mouth of Grande Ronde River) Portable Acclimation/Release Facility		**0**
5522100	Development and Refinement of Natural Production Objectives and Enhancement Strategies for Yakima Basin Anadromous Salmonids		**66,500**
5522300	Box Canyon Watershed Project		17,280
5522700	Enhanced Tribal Tributary Fish and Wildlife Law Enforcement-- Part 1. Nez Perce Tribes	**0**	0
5522900	Wildlife Plan: Standardize M&E	**0**	100,000
8200300	Selective Predation/Development of Prey Protection	404,000	470,798
8201300	Coded-Wire Tag Recovery	1,160,588	1,408,294
833 1900	New Fish Tag System	430,100	800,000
8332300	Smolt Condition & Arrival Timing at Lwr Granite	3 17,900	342,000
8335000	Nez Perce Tribal Hatchery	3,340,000	**6,660,000**
8343500	Umatilla Hatchery Satellite Facilities Operation and Maintenance.	334,000	425,000
8343600	Umatilla Passage O&M	280,500	421,200
8346500	Libby and Hungry Horse Modeling Technical Analysis	30,000	33,460
8346700	Libby Reservoir Levels/Kootenai IFIM	325,000	3 10,700
8400800	North Fork John Day Habitat Improvement		30,000
8401400	Smolt Monitoring at Federal Dams	654,500	800,000
8402100	Mainstem, Middle Fork, and N. Fork John Day River	297,000	350,000
8402500	Grande Ronde Habitat Enhancement	0	250,000
8503800	Colville Tribal Fish Hatchery	335,000	350,000
8506200	Passage Improvement Evaluation	280,500	300,000
8605000	White Sturgeon Productivity Status and Habitat Requirements	0	2294,400
8612400	Insp Serv for Little Fall Creek Pass Re:86-090	4,000	**2,000**
8709900	Dworshak Dam Impacts Assessment	175,000	167,300
8710001	Umatilla River Basin Anadromous Fish Habitat Enhancement	293,000	275,000
8710002	Umatilla Habitat Improvement / ODFW	190,009	235,000
8712700	Smolt Monitoring by Non-Federal Entities	1,237,000	1,212,704
8740100	Travel Time and Survival Smolt Physiology	750,000	469,000
8740700	Dworshak Impacts/M&E & Bio-Int Rule Curves	181,000	143,400
8802200	Umatilla River Basin Trap and Haul Program	382,000	430,000
8805301	Northeast Oregon Out-planting Facilities Master Plan - Nez Perce Tribe	400,000	1,200,000
8805302	Ne Oregon Hatchery - Grand Ronde Satellite Facilities		1,400,000
8805303	Hood River Production Program - CTWS - M&E	374,000	515,000
8805304	Hood River Production Program - ODFW - M&E	394,000	425,000

Project #	Title	FY96 Auth. S	FY97 s
8806400	Kwtenai River White Sturgeon Study and Experimental Aquaculture	32,886	460,000
8806500	Kwtenai River Fisheries Investigations	462,000	485,839
8810804	Streamnet (formerly CIS and NED)	0	2,000,000
8811500	Yakima Hatchery - Construction	1,174,000	700,000
8812001	Yakima/Klickitat Fisheries Project Management	0	763,000
8812004	Hatchery Training and Education	0	231,202
8812005	Fish Passage Video Monitoring	. 0	215,000
88 12008	Fisheries Technician Field Activities	0	822,564
88 15600	Duck Valley Fish Stocking Program	100,000	105,160
8816000	Willamette Hatchery Oxygen Supplementation	98,000	98,700
8816300	Effects of Coded Wire Tagging on the Survival of Spring Chinook	174,000	160,000
8902401	Eval Umatilla Basin Prj - 3-Mile/Weid Canal Scr	240,000	300,302
8902700	Power/Repay O&M for USBR CPR Pumping Proj	271,150	750,000
8902900	Hood River Production Program - Pelton Ladder - Hatchery		142,000
8903000	Effects of Acclimation on the Survival of Spring Chinook Salmon aka: Eva1 of Pre-Rel Temp Acclimation at Klickitat Htch	34,000	36,121
8903500	Umatilla Hatchery Operations and Maintenance		1,250,000
8906200	Prepare Draft Annual Implementation Work Plan	395,000	800,000
8906500	Annual Fish Marking Program-Missing Hatchery Production Groups OR/WA/ID (USFWS)	248,710	278,000
8906600	Ann Cd Wire Tag Prog-Missing Prod WA Htch (WDF)	95,937	310,000
8906900	Amt Cd Wire Tag Prog-Missing Prod OR Htch(ODFW)	125,000	175,000
8907201	Independent Scientific Group Support	450,000	100,000
8909600	Genetic Monitoring and Evaluation of Snake River Salmon and Steelhead	23 1,880	250,000
8909800	Idaho Supplementation Studies (ISS)	791,010	875,000
8909801	Salmon Supplementation Studies in Idaho Rivers - USFWS	90,695	125,000
8909802	Salmon Supplementation Studies in Idaho Rivers - Nez Perce Tribe	145,000	270,000
8909803	Salmon Supplementation Studies in Idaho Rivers - Shoshone-Bannock Tribes	121,000	172,009
8910700	Epidemiological Survival Method	154,018	150,000
8910800	Monitoring and Evaluation Modeling Support	500,000	200,000
9000500	Umatilla Hatchery - Monitoring/Eva1 Projects	544,000	545,000
9000501	Umatilla Basin Natural Production Monitoring and Evaluation (UBNMPE)	0	700,000
900 1800	Habitat Improvement - Lake Roosevelt	200,000	198,848
9004400	Strm Survey, Htchry, Hab hnprov, Mntr Coeur D	500,000	764,800
9005200	Perf/Stock Prod Impacts of Hatchery Suppl,	300,000	444,000
9005500	Steelhead Supplementation Studies in Idaho Rivers		220,000
9006900	Yakima Hatchery - Final Design	701,250	900,000
9007700	Northern Squawfish Management Program	3,842,850	4,000,000
9007800	System-Wide Significance of Predation on Juvenile Salmonids in Columbia and Snake River Reservoirs and Evaluation of Predation Control Measures	400,000	285,000

Project #	Title	FY% Auth. S	FY97 $
9008000	Columbia Basin Pit-Tag Information System	982,685	1,550,000
9009200	Conforth Ranch - O&M and Enhancements	200,000	200,000
9009300	Genetic Analyses of Oncorhynchus Nerka (ESA)	125,000	140,000
9101400	Umatilla Hatchery Satellite Facilities - Planning, Siting, Design, and Construction	3,015,810	2,000,000
9101901	Hungry Horse Fisheries Mitigation - Confederated Salish and Kwtenai Tribes	40,000	66,920
9101903	Hungry Horse Mitigation/Habitat Improvements.	260,000	382,400
9101904	Hungry Horse Mitigation - Creston Fish Recovery	600,000	465,000
9102800	Monitoring the Smolt Migrations of Wild Snake River Spring/Summer Chinook Salmon	313,225	303,800
9102900	Life Hiiory of Fall Chin in Co1 River Basin	1,053,000	1,000,000
9104600	Spokane Triil (Galbr Sprgs) Hatchery - O&M	420,000	420,000
9104700	Sherman Creek Hatchery - O&M	180,000	178,000
9105500	Supplementation Fish Quality (Yakima)	280,500	400,000
9105700	Yakima Phase 2 Screen Fabrication	300,000	300,000
9106000	Kalispel - Pend Oreille Wetlands	123,000	150,000
9106700	Idaho Water Rental - Resident F&W Impacts - Phase III	128,000	114,720
9107100	Snake River Sockeye Salmon Habitat	408,000	600,000
9107200	Redfish Lake Sockeye Sahnon Captive	612,33 1	663,000
9107300	Idaho Natural Prod. Monitoring/Eval 83-7 (ESA)	649,825	550,000
9107500	Yakiia Phase II Screens - Construction	1,547,425	1,500,000
9107800	Burlington Bottoms Wildlife Mitigation Project	75,000	52,000
9200900	Yakima Screens - Phase II - 0 & M	75,000	85,000
9201000	Habitat Restoration/Enhancement Fort Hall Bottoms	125,000	119,500
9202200	Wild Smolt Behavior/Physiology (ESA)	345,673	350,000
9202400	Columbia Basin Law Enforcement Program	3,316,894	4,457,000
9202601	Grande Ronde Model Watershed - Admin/Impl./Research	280,000	305,000
9202602	Eastern WA Model Watershed Coordinators	114,854	162,000
9202603	Idaho Model Watersheds Adnim/Impl. Support	140,764	196,900
9202604	Spring Chinook Salmon Early Life History		526,000
9202800	Fish Screen Oversight Committee (FSOC), Tributary Passage and Habitat Coordinator (TPHC)	164,000	94,000
9203200	Life-Cycle Model Development and Application to System and Subbasin Planning in Snake River	0	65,000
9204000	Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research	429,165	500,000
9204101	Evaluation of Adult Salmon and Steelhead Migration Past Dams, and Through Reservoirs in the Lower Columbia River and Into Tributaries	0	350,000
9204300	Integrated Hatchery Operations Team	65,000	594,000
9205900	Amazon Basin/Eugene Wetlands - Phase II	0	51,000
9206100	Albeni Falls Wildlife Mitigation Implementation (formerly Pend Oreille Wetlands [IDFG] - Phase I)	500,000	800,000

Project #	Title	FY96 Auth. $	FY97 s
9207102	Technical Assistance for Juvenile and Adult Migrant Monitoring Facilities		100,000
9207300	An Automated Fish Marking and Tagging System	0	200,000
9300802	Symptoms of Gas Bubble Trauma Induced in Salmon by Total Dissolved Gas Pressure Supersaturation in the Snake and Columbia Rivers		900,000
9301900	Hood River Production Program (Parkdale Design & Construction)		2,570,000
9302900	Survival Estimation for Dam/Reservoir Passage	748,000	1,200,000
9303000	Buck Hollow Watershed Enhancement (SWCD)		110,000
9303501	Lower Red River Meadow Restoration Project		729,000
9303600	Haysfork Glory Hole, Newsome Creek Placer Mine Silt Trap - Nez Perce Tribe		30,000
9303701	Technical Assistance With the Life Cycle Model	50,090	60,000
9303806	North Fork John Day Area Riparian Fencing	53,295	80,000
9304000	Fifteenmile Creek Habitat Improvement	229,090	325,000
9304500	Buck Hollow Watershed Enhancement (ODFW)	53,000	75,000
9305600	Assessment of Captive Broodstock Tech	979,000	1 ,0OO,000
9305800	WDFW - Washington Wildlife Mitigation Agreement	7,545,OOO	7,600,000
9306000	Columbia River Terminal Fisheries Research Project	786,000	900,000
9306200	Salmon River Anadromous Fish Passage Enhancement, Idaho		100,000
9306600	Oregon Fish Screens Project	250,000	420,000
9401094	Monitoring and Evaluation of Lyons Ferry Hatchery Fall Chinook Above Lower Granite Dam		0
9401200	Kootenai River White Sturgeon - M&E	75,000	95,600
9401500	Idaho Fish Screening Improvement (see new NPPC)	700,984	1,000,000
9401700	Idaho Model Watershed Habitat Projects	23,375	200,009
9401800~	Washington Model Watershed Habitat Projects		600,000
9402600	Pacific Lamprey Research and Restoration Project	335,000	352,009
9402700	Grande Ronde Model Watershed Habitat Projects	260,000	1,439,000
9403300	Fish Passage Center	864,875	1,082,500
9403400	Assessing Summer/Fall Chinook Restoration in the Snake River Basin	225,997	203,000
9403900	Wallowa Basin Project Planning - G. R. Model Watershed	50,000	50,494
9404200	Trout Creek Operation & Maintenance	187,000	250,900
9404300	Lake Roosevelt Monitoring / Data Collection Program	150,000	1,242,800
9404709	Lake Pend Oreille Fishery Recovery		3 15,480
9494900	Kwtenai River Ecosystem Improvements Study	175,008	226,572
9405000	Salmon River Habitat O&M/Monitoring & Evaluation	253,000	268,006
9405300	Bull Trout Assessment - Willamette/Mckenzie	50,000	47,800
9405400	Bull Trout Studies in Central and NE Oregon	250,009	239,000
9405900	Yakima Basin Environmental Education	89,760	100,000
9500100	Kalispel Tribe Resident Fish	795,000	645,300
9500400	Libby Reservoir Mitigation Plan	150,000	38,240
9500600	SBT/SPT Joint Culture Facility	1,400,000	315,000

Project #	Title	FY96 Auth. S	FY97 $
9500700	Hood River Production Program - PGE O&M	0	56,000
9500900	Lake Roosevelt Rainbow Trout Net Pens	115,000	95,600
9501100	Chief Joseph Kokanee Enhancement Project	500,000	573,600
9501300	Nez Perce Trout Ponds	158,000	286,800
950 1500	Billy Shaw Res Development	485,000	3,360,340
9501600	Genetic Inventory Westslope Cutthroat Trout	164,000	167,300
9502100	Okanogan Watershed Planning		125,000
9502500	Flathead River Instream Flow Study		95,600
9503300	O&M of Yakima Fish Protection, Mitigation & Enhancement Facilities	12,155	200,000
9505700	South Fork Snake/Sand Creek Wildlife Mitigation		3,000,000
9506000	Umatilla River Riparian Corridors: Squaw Creek Watershed Project (Anadromous Portion)	0	1,900,000
9506001	Umatilla River Riparian Corridors: Squaw Creek Watershed Project (Wildlife Portion)	0	600,000
9506300	Yakima/Klickitat Monitoring and Evaluation Program	1,449,250	1,550,000
9506401	Refinement of Marking Methods for YKFP	0	25,000
9506402	Upper Yakima Species Interaction Studies	0	400,000
9506404	Policy/Technical Involvement and Planning'for YKFP	0	275,000
9506800	Klickitat Passage/Habitat Preliminary Design	0	776,5 11
9600500	Operation of the Independent Scientific Advisory Board		620,000
9600600	PATH - Facilitation, Tech Assistance & Peer Review	0	450,000
9600700	Upper Salmon River Diversion Consolidation Program	0	645,000
9600800	PATH - Participation by State and Tribal Agencies	0	716,200
9601100	Juvenile Fish Screens and Smolt Traps at Irrigation Diversion Dams on the Walla Walla and Touchet Rivers in Oregon and Washington	90,000	600,000
9601200	Adult Anadromous Fish Passage Improvement at Irrigation Diversion Dams on the Walla Walla River	100,000	350,000
9601600	In-Season Operations Technical Management Team (TMT) Support		0
9602000	1997 Hatchery Pit Tag Study	0	550,000
9602100	Gas Bubble Disease Monitoring and Research of Juvenile Salmonids		750,000
9602200	Evaluating Effects of Dissolved Gases on Resident Fish		180,900
9602400	Changes in Gas-Bubble Disease Signs and Survival of Migrating Juvenile Salmonids Experimentally Exposed to Supersaturated Gases		228,000
9603201	Hanford K-Basin Fall Chinook Acclimation and Master Plan Development		358,400
9603301	Yakima River Fall Chinook Supplementation		660,800
9603302	Yakima River Coho Restoration		143,360
960340 1	Metbow Valley Irrigation District Conversion		861,000
9603501	Satus Watershed Restoration		200,000
9604000	Wenatchee and Methow River Coho Restoration'		324,800
9604300	Johnson Creek Artificial Propagation Enhancement		792,793
9604400	Grande Ronde Basin Spring Chinook Captive Brwdstock Program		2,212,400